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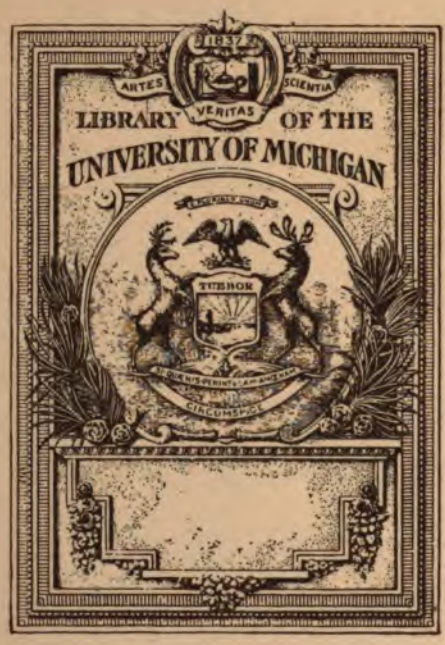
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URANOSCOPIA

Or, the Contemplation of the

HEAVENS, *&c.*

ON THE

Contemplation of the Heavens.

URANOSCOPIA:

OR, THE

Contemplation of the Heavens.

BEING A

Demonſtration of the Equation of Time.

With the

Method of obſerving the Solar Ingreſſes into any Point of the Ecliptic; and the Inveſtigation of the Aphelions, and Eccentricities of the Planets.

The Determination of the greateſt Elongation of VENUS and MERCURY from the SUN.

Of the Mean Motion of the Earth, her Aphelion, and the Receſſion of the Equinox; the SUN and MOON's True and Apparent Places, by Calculation and Obſervation: With the true Hour of the Night, by the STARS; perform'd by a New Quadrant.

Alſo, an Explanation and Demonſtration of the Keplerian and Flamſteedian Methods of Computing the Times, and principal Appearances of Solar Eclipſes. To which are added, New Tables of the Nonageſime Degree, its Altitude; the Moon's Parallax in Altitude, Longitude and Latitude. With many other things uſeful for ſuch a Work.

By CHARLES LEADBETTER, Teacher of the Mathematicks.

LONDON,

Printed for J. WILCOX at *Virgil's Head*, againſt the New Church in the *Strand*. MDCCXXXV.

THE INTRODUCTION.

READER,

Here preſent you with what I promiſed in the 418th Page of my *Compleat Syſtem of* ASTRONOMY; that is, the method of Computing the Latitudes and Longitudes of the Places of the Globe where the principal Apearances of Solar Eclipſes are Viſible.

And, as it was the Great *Kepler* that firſt made uſe of this method; ſo it was our Country-man Mr. *Flamſteed* that took it into conſideration and improved it: But becauſe the former wrote in *Latin*, and the latter giving but only one ſhort Example, and that Book is become ſcarce and conſequently dear, I have therefore in the following Sheets endeavoured to explain both their Methods in divers Examples.

And as the times of the Univerſal Eclipſes are firſt to be had before you can proceed to find where the principal Appearances are ſeen; theſe muſt be Learned from the 17th Precept of my forecited Book; in which you are to obſerve, that the time of the Ecliptic Conjunction, is always equal

equal to the time that the Sun is Centrally Eclipſe in the Nonageſime Degree; which you may th better underſtand by carefully tracing the fo lowing Calculations.

And as this Method of Projecting Solar Eclip ſes, and the Paſſage of the *Penumbra* over the Earth' Disk, I have ſufficiently explain'd in the 419t Page of my SYSTEM; yet it will not be imperti nent to acquaint the Reader (in this place) that if we imagine a Plane to paſs thro' the Center o the Earth, ſo that the Line which joyns the Cen ters of the Sun and Earth, may be perpendicula to this Plane, it will make on the Surface of the Earth a Circle, which will ſeparate the illuminated Hemiſphere of the Earth from the Dark.

This Circle is called the *illuminated Disk*, which Disk is directly ſeen by a Spectator placed at the diſtance of the Moon, in the right Line which joyns the Centers of the Sun and Earth.

Upon this Circle the Earth's Equator, its Parallels, Poles, and all other Circles which we imagine, are to be ſuppoſed Projected Orthographically: For all Lines drawn from the Center of the Sun to every ſingle Point of the Disk being perpendicular to it, all the reſt will be perpendicular to it; and then an Obſerver in the Moon will ſee all Countries, Cities, and Towns to move upon the Disk, which is occaſioned by the Rotation of the Earth round its Axis from Weſt to Eaſt: And every Point will have its way on the Disk: For by the Diurnal Gyration, all Places deſcribe either the Equator, or one of its Parallels; and if the Sun be in the Plane of the Equinoctial, or rather if the Plane of the Equinoctial paſs thro' the Sun, the Equi-

Equinoctial and all its Parallels are in that caſe projected into Right Lines: For they will all be Perpendicular to the Disk, or Plane of the Projection.

But in other Poſitions of the Earth, or Sun, the Projection of theſe Circles will be Ellipſes, which is the way that all the Places of the Earth are ſeen to move on the Disk.

Now, if thro' the Pole and the Sun there be a great Circle drawn which cuts the Earth, and this Circle be Projected on the Disk, it will be the Univerſal Meridian, (as in the three following general Schemes is Noted with ⊖ being the Earth's Axis.) To which, when any Place is obſerved to come, the Inhabitants of that Place will have Mid-day. And when any Place is ſeen to touch the Weſtern Limb, or Edge of the Disk, the Inhabitants of that Place will then ſee the Sun riſing to them; but a Spectator at the Moon will ſee the Place to riſe and come upon the Disk, and will ſee it move towards the Eaſt: (becauſe the Eye at the Moon is carried that way) and as ſoon as it has paſs'd the Univerſal Meridian, the Place then being gone to the Eaſtward, the Sun ſeen out of the Earth from the place will apppear to move Weſtward. But when the place comes to the Eaſtern edge of the Disk, the Spectator in the Moon will obſerve the Place to ſet in the Disk; but the Inhabitants of that place upon the Earth's Surface will ſee the Sun to ſet in the Weſt.

Theſe being the chief Properties of this Projection, I ſhall hereunto ſubjoyn the twelve Propoſitions of *Theodoſius*, which will give great light into the *Keplerian* Method.

PRO-

PROPOSITION I.

To thoſe that inhabit under the North Pole, one and the ſame Hemiſphere of the World is always apparent; but the other Hemiſphere is always hidden: Nor do any Stars, either riſe or ſet to them; but thoſe that are in the upper Hemiſphere are always conſpicuous, and contrarily thoſe in that, which is hidden, never appear.

II. To thoſe People that inhabit under the Equinoctial Circle, all the Stars do riſe and ſet; and are moved in equal time of 12 Hours above the Horizon, and under it.

III. In every Place within the Middle, or Torrid Zone, the Ecliptic Circle is at ſome certain time of the Day at right Angles to the Horizon of the Place: For the Circle parallel to the Equator, drawn thro' the *Vertex* or Zenith of the place, cuts the Ecliptic Circle in two Points. When therefore the Point of either Interſection is co-united with the Zenith, then the Ecliptic paſſes thro' the Poles of the Horizon; and therefore it cuts the Horizon at right Angles; and this is done twice in one Diurnal Revolution. But to thoſe inhabiting under either Tropick, only once in a Day, that is, when the Solſtitial Points in which the Ecliptic touches both the Tropicks come to the Zenith of that place. See the Table of the Altitude of the Nonageſime Degree. This is made Plain.

IV. To

IV. To thoſe whoſe Zenith is as far diſtant from the Pole. as the Tropicks from the Equator, ſix Signs ſhall at once happen to riſe, and ſix to ſet, in one Diurnal Revolution; that is, to thoſe whoſe Zenith is in the Artic or Antartic Circle. For whereas the Poles of the Ecliptic are carried in the Peripheries of thoſe Circles. therefore in one Diurnal Revolution the Pole is once co-united with the Zenith; that is, the Pole of the Ecliptic with the Pole of the Horizon; and therefore, the Ecliptic is alſo co-united with the Horizon. Which Co-union is made in an inſtant; and after that inſtant the Ecliptic is forthwith divided into two parts by the Horizon: So that in an inſtant one Semicircle of the Ecliptic riſes, and the other Semicircle ſets.

V. To thoſe People inhabiting under the Equinoctical Circle, the Meridian ſhall cut above the Horizon the Semicircle of the Ecliptic into two equal parts, when the Points of Contact of the Tropicks and Ecliptic come to be in the Horizon; and then alſo the Ecliptic ſhall be at right Angles to the Horizon.

For, the Horizon then paſſing thro' the Poles of the Tropick, (the ſame with the Poles of the World) and the Points of the Contact of the Tropicks and Ecliptic ſhall (by the Laws of Sphericks) paſs likewiſe thro' the Poles of the Ecliptic; and therefore ſhall cut the ſame at right Angles: And likewiſe the Ecliptic paſs thro' the Poles of the Horizon, by which the Meridian alſo paſſes.

From whence the Arches, as well of the Meridian, as of the Ecliptic, intercepted between the Pole of the Horizon, and the Horizon, are Quadrants.

VI. To thoſe Inhabiting under the Equinoctial, all Semicricles of the Ecliptic ariſe in equal time, as likewiſe do their oppoſite Peripheries.

For there, every Semicircle of the Ecliptic ariſes with the Diurnal Arch of its beginning; (but by the ſecond hereof) all the Diurnal Arches are Semicircles, by which is manifeſt, the firſt part of this Propoſition: The other part is clear, ſeeing not only the oppoſite Peripheries of the Ecliptic, but thoſe likewiſe equally diſtant from the Equinoctial Points aſcend, with equal Arches of the Equinoctial.

VII. To thoſe People whoſe Horizon differ by a more Eaſterly Poſition, the Stars neither ariſe together, nor ſet together; but by how much ſooner they ariſe to thoſe who live more Eaſterly, by ſo much ſooner do they ſet: For the Horizons of ſuch equal Places, by reaſon of equal Altitude of the Pole, touch the ſame Parallel of the Equator; wherefore the Arch from any Parallel of the Semicircle of the Horizon interjected, as well between the places Eaſtward, as thoſe Weſtward, are the ſame. Therefore every Star in a place Eaſtward by the ſame Arch, anticipates its riſing, and thence its Setting, and conſequently in the ſame interval of time.

VIII. To

VIII. To thoſe inhabiting under the ſame Meridian, whatever Stars are between the greateſt of the always apparent Parallels and the Equinoctial, appear longer above the Horizon to thoſe inhabiting Northward, than they do to thoſe inhabiting Southward.

And how much ſooner they ariſe to thoſe inhabiting Northward, ſo much later they ſet. But thoſe Stars which are between the greateſt of the Parallels always latent, (or hid) and the Equinoctial, appear longer above the Horizon, to thoſe inhabiting Southward, than they do to thoſe inhabiting Northward; and how much ſooner they riſe to thoſe inhabiting, ſo much later they ſet.

For to one travelling towards the apparent Pole, the Diurnal, increaſes; and to one going towards the Pole that is depreſſed, the Diurnal Arch of a Star, declining thitherward, increaſes likewiſe: But by Collating the Arches increaſing on either ſide, that is to ſay, towards the Eaſt, or towards the Weſt, the reſt of the Propoſition is manifeſt.

IX. But if the Horizons be neither under one Parallel, nor under the ſame Meridian, there will follow only an Inequality of the Arches raiſed above the Horizon, after the manner as before expreſſed; but no Anticipation of Riſings or Settings. This, as the premiſed, is manifeſt by reaſon of the greater or leſſer Inclination of the Horizon.

X. To thoſe Inhabitants under either Pole, the Sun is carried conſtantly for ſix Months (nearly) above the Horizon, and as long underneath it.

This appears by the firſt Propoſition, ſince one half of the Ecliptic is always apparent, and the other always latent; either of which by the Sun (apparently) in near about ſix Months time, is run through.

XI. To thoſe going from the Pole towards the Artic or Antartic Circles, this conſtant Stay of the Sun either above or under the Horizon, for ſix Months, grows leſſer and leſſer, until it be reduced to the ſpace of 24 Hours, either under the Artic or Antartic Circle: For, the Horizon of thoſe Habitations, touch two Parallels of the Equator greater than the Tropicks, which on either ſide cut from the Eliptic two equal Peripheries; and that Periphery which the Parallels always cuts off, never ſets, and that which is always latent, never riſes. Latent, always ſignifies *hid*.

To thoſe inhabiting under the Artic or Antartic Circles, the longeſt Day is 24 Hours, and the Night but an inſtant; on the contrary, the longeſt Night 24 Hours, and the Day but an inſtant.

The other Arks increaſe and decreaſe until they come to the Equality of the Equinox.

THE

THE

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ADVERTISEMENT.

THE Author hereof, teacheth Aſtronomy in all its Parts; with Navigation, Surveying, Gauging, and Dialling, at his Houſe, at the *Hand* and *Pen* in *Cock-Lane, Shore-Ditch, London.*

Any Perſons that write to him out of the Country about their own Buſineſs, are deſired to pay the Poſtage of their Letters; otherwiſe they may expect no Anſwer.

ERRATA.

ERRATA.

PAge 34, for *Sum*, read *Sun*; p. 55, Line *ult.* r. *half*; p. 60. l. 9, for 22, r. 23; p. 64, l. 12, for 549, r. 459; p. 77, l. 22, for 36, r. 35; p. 90, l. 4, r. for 1724, r. 1734; and under *Apog.* for 38. r. 8; p. 118, l. *ult.* r. *Sign* 11; and for 14, r. 4; p. 120, l. *ult.* for 5, r., 4 and 3 *Sign* under 9, for *Page* 86, r. 186; p. 281, l. 36, for *Gard*, r. *Card*; p 304, before 6, under the black Line. CHAP. 22; p. 552, l. 4, for *Parallax* r. *Parallax.*

URANOSCOPIA.

CHAP. I.

A Demonſtration of the Equation of Time.

BEING now upon the Buſineſs of Demonſtrating my Aſtronomical Obſervations, it will not be improper to ſpeak ſomething of the Inequality of Natural Days: For without a right underſtanding in that, the Aſtronomer will be at a loſs to regulate his curious Time-keeper, and thereby make wrong Obſervation. This is a Matter that has exercis'd the Thoughts of Aſtronomers in all Ages: And tho' all have allow'd, that there really is ſuch an Inequality, yet they have much diſagreed in aſſigning its Quantity, and demonſtrating the Reaſon and Affection thereof; becauſe they all built upon a wrong Hypotheſis, ſuppoſing the Earth at reſt; which produced them but one part of the Equation of Natural Days: And with this they ſatisfied themſelves, not thinking but that they then had the whole, whereas they had only one half.

Thus, the Equation of Time, which depends upon the Obliquity of the Ecliptic, was made uſe of till about the Middle of the laſt Century, when our Country-Man *Street*, in his Ephemeris for the Year 1655, gave a little Sketch of its Demonſtration, which he afterwards put in his *A-*

ſtronomia Carolina, with Tables of the Equation of Time, in Two Parts; where he groſsly miſtakes the Second Part, and bids us to Add, when we ſhould Subtract, *& contrà*; leaving the Second Part without any Demonſtration at all; till at laſt, our moſt Learned Aſtronomer Mr. *Flamſteed*, has determin'd the Controverſy, and by moſt evident Demonſtrations Geometrical has put the matter beyond further Diſpute, clearly evincing both the Reaſons, Affections, and Quantity of this Inequality. His Diſſertation concerning this, is annex'd, and publiſh'd at the End of the *Opera Poſthuma Jeremiæ Horroxii*, *Lond.* 1673, 4*to.* to which I refer my Reader.

Let us now, with Dr. *Keill*, ask who they are that dare tell us, that the Sun doth not tell the Truth? The Aſtronomers are the bold Men that tell us ſo: For they, by their nice Search into Things, have found, that the Sun's apparent Motion is no ways equal: They obſerve, that he now and then ſlackens his pace, and afterwards quickens it again: And therefore Equal Time, which goes on always at the ſame rate, cannot truly be meaſur'd by the Sun's Motion. *Keill*, *Lect.* Page 313. Aſtronomers have diſtinguiſh'd the Days into Civil and Natural.

1. A Civil Day being that Space of Time containing juſt twenty four Hours, reckon'd from Twelve of the Clock at Noon on one day, unto Twelve of the Clock at Noon on the next day; in which time the Equinoctial makes one entire Revolution about the Axis of the World.

2. The Natural, or Apparent Day, is that Space of Time, in which the Sun moves from the Meridian of one Place, to the ſame Meridian again. Theſe Days are not always of an equal Length; but are longer at ſome times of the Year than at other times. The difference between theſe two ſorts of Days is but ſmall; and there is a double Cauſe for this ſmall Inequality.

All Aſtronomical Time begins at the Noon of one day, and ends at Noon on the next following day; and this agrees with the *Natural Day* above-mention'd.

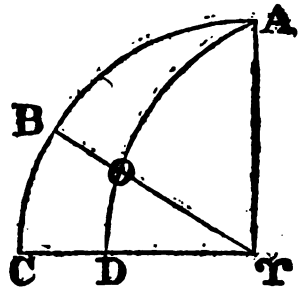
This has alſo two Demonſtrations, *viz.* Equal and Apparent.

The Equal Time is that which is kept by an equal Motion in the Equinoctial; to which Time all Aſtronomical Tables are exhibited.

The

The Apparent Motion, or Time Apparent, is the ſenſible or external Meaſure, eſtimated by the Sun's Apparent unequal Motion in the Ecliptic; to which, all Calculations Aſtronomical muſt be reduced.

In this adjacent *Diagram*, let A B C be a Quadrant of the Solſtitial Colure, A the Pole, ♈ C a Radius of the Equinoctial, ♈ B a Radius of the Ecliptic, ♈ the Equinoctial Point, or the Place of the Sun in the Beginning of it at Noon on ſome certain day, ☉ the Sun's Place at Noon the day following; through which Place ſtrike the Arch A ☉ *D*, to cut the Equinoctial at Right Angles in *D*: ♈ ☉ will expreſs the diurnal Motion of the Sun, and ♈ *D* its Right Aſcenſion, or the Equinoctial that culminates with the Sun: which Arch, ſeeing it is one of the Sides of a Right-angled Spheric Triangle ♈ *D* ☉, cannot be equal to the Hypothenuſe, that is, to the Sun's Motion ♈ ☉.



Wherefore ſeeing the Revolutions of the Equinoctial, and of its equal or like Parts, are equable, and performed in equal times; but the Sun, in paſſing equal Parts of the Ecliptic, apply to the Meridian with unequal Parts of the Equinoctial; it neceſſarily follows, that the Solar Days are unequal.

And that the difference between the Sun's true Place and its Right Aſcenſion, being converted into Time, is the true Equation of Time ariſing from this Cauſe. Which Equation in the firſt and third Quadrants of the Ecliptic is to be ſubtracted from the Apparent Time: For in them the Longitude of the Sun from the next Equinoctial Point paſſes the Meridian ſooner than a like Arch projected in the Equinoctial. But in the ſecond and fourth Quadrants of the Ecliptic, this Equation is to be added to the Apparent Time to get the Mean; for in theſe the Longitude of the Sun from the Equinoctial Point *Libra* paſſes the Meridian later than the like Arch projected in the Equator.

For Example, Let the Longitude of the Sun from the Equinoctial Point ♈ be ♈ ☉ = 59′ 8″, its Right Aſcenſion, or the Arch of the Equinoctial culminating therewith will

be ♈ D 54′ 14″, being leſs than ♈ ☉ by 4′ 54″; which being turned into Time (by the Table, Page 66, of my Aſtronomy) is 19″ 36‴; and by ſo much is the Apparent Day ſhorter than the Mean.

This therefore is the Equation of Time ariſing from this Cauſe, and is Negative, or to be ſubtracted from the Apparent Time, to obtain the Mean Time: For the Longitude of Sun arrives at the Meridian ſooner than a like Arch projected in the Equinoctial.

To make all plain, I ſhall annex the following Table, ſhewing the Sun's Right Aſcenſion to every Degree of the Ecliptic; in which I have number'd the Sun's Place from *Aries*, increaſing by one Degree round the Ecliptic, to 360°. At the Top of every Column I have ſet the Signs, for a Guide to know in what part of the Ecliptic the Sun is: By which you may perceive, that in the firſt Quadrant, that is, all the time the Sun's Place is leſs than 90°, the Sun's Place exceeds the Right Aſcenſion; but in the ſecond Quadrant, that is, while he is moving from *Cancer* to *Libra*, his Place being leſs than 180°, the Right Aſcenſion is more than the Sun's Place. In the third Quadrant, the Longitude is again greater than the Right Aſcenſion; but in the 4th or laſt Quadrant it is again leſs, as in the ſecond.

Now it is from this Table that I conſtructed that in Page 2. of my Aſtronomy. Thus, let the Sun be one Degree in *Aries*, his Right Aſcenſion is 55′ 4″; which ſubtracted from 1°, leaves 4′ 58″; which turned into Time, is 19″ 52‴. Now becauſe I omit Thirds in that Table, therefore I call 19″ 52‴: 20″, which is the firſt Number in that Table of the firſt Part of the Equation of Time, to be added to the Equal, or ſubtracted from the Apparent Time. Again, let the Sun be in 15° *Taurus*; that is, 45° from the beginning of *Aries*, and his Right Aſcenſion is 42° 31′ 34″; this difference is 2° 28′ 26″; which reduced into Time, is 9′ 53″ 44‴, to be added to the Equal, or ſubtracted from the Apparent Time, as that Table directs, which was conſtructed from this, after the manner now directed.

Sun's

Sun's Place		R. Aſcenſion °	′	″	Sun's Place		R. Aſcenſion °	′	″
♈	1	0	53	2	♉	31	28	51	32
	2	1	50	4		32	29	49	3
	3	2	45	7		33	30	46	44
	4	3	40	10		34	31	44	33
	5	4	35	15		35	32	42	32
	6	5	30	22		36	33	40	41
	7	6	25	31		37	34	38	59
	8	7	20	42		38	35	37	28
	9	8	15	55		39	36	36	6
	10	9	11	11		40	37	34	55
	11	10	6	30		41	38	33	54
	12	11	1	53		42	39	33	3
	13	11	57	20		43	40	32	22
	14	12	52	51		44	41	31	53
	15	13	48	26		45	42	31	24
	16	14	44	6		46	43	31	26
	17	15	39	51		47	44	31	29
	18	16	35	40		48	45	31	43
	19	17	31	35		49	46	32	7
	20	18	27	36		50	47	32	43
	21	19	23	44		51	48	33	30
	22	20	19	58		52	49	34	28
	23	21	16	18		53	50	35	36
	24	22	12	46		54	51	36	55
	25	23	9	20		55	52	38	25
	26	24	6	2		56	53	40	6
	27	25	2	52		57	54	41	58
	28	25	59	49		58	55	44	0
	29	26	56	55		59	56	46	13
	30	27	54	19		60	57	48	36

Sun's Place.	R. Aſcenſion °	′	″	Sun's Place.	R. Aſcenſion °	′	″
♑ 61	58	51	9	♋ 91	91	5	25
62	59	53	52	92	92	10	50
63	60	56	46	93	93	16	14
64	61	59	49	94	94	21	36
65	62	3	1	95	95	26	56
66	64	6	23	96	96	32	15
67	65	9	54	97	97	37	30
68	66	13	33	98	98	42	43
69	67	17	21	99	99	47	52
70	68	21	18	100	100	52	57
71	69	25	22	101	101	57	57
72	70	29	33	102	103	2	52
73	71	33	53	103	104	7	44
74	72	38	19	104	105	12	29
75	73	42	52	105	106	17	8
76	74	47	31	106	107	21	21
77	75	52	16	107	108	26	7
78	76	57	7	108	109	30	27
79	78	2	3	109	110	34	38
80	79	7	3	110	111	38	42
81	80	12	8	111	112	42	39
82	81	17	17	112	113	46	27
83	82	22	30	113	114	50	6
84	83	27	45	114	115	53	37
85	84	33	4	115	116	56	59
86	85	38	24	116	118	0	11
87	86	43	46	117	119	3	14
88	87	49	10	118	120	6	8
89	88	54	35	119	121	8	51
90	90	00	00	120	122	11	24

Sun's Place	R. Aſcenſion °	′	″	Sun's Place.	R. Aſcenſion °	′	″
♌121	123	13	47	♑151	153	3	5
122	124	16	0	152	154	0	11
123	125	18	2	153	154	57	8
124	126	19	54	154	155	53	58
125	127	21	35	155	156	50	40
126	128	23	5	156	157	47	14
127	129	24	24	157	158	43	42
128	130	25	32	158	159	40	2
129	131	26	30	159	160	36	16
130	132	27	17	160	161	32	24
131	133	27	53	161	162	28	25
132	134	28	17	162	163	24	20
133	135	28	31	163	164	20	9
134	136	28	34	164	165	15	54
135	137	28	29	165	166	11	34
136	138	28	7	166	167	7	9
137	139	27	38	167	168	2	40
138	140	26	57	168	168	58	7
139	141	26	6	179	169	53	30
140	142	25	5	170	170	48	49
141	143	23	54	171	171	44	5
142	144	22	32	172	172	39	18
143	145	21	1	173	173	34	29
144	146	19	19	174	174	29	38
145	147	17	28	175	175	24	45
146	148	15	27	176	176	19	50
147	149	13	16	177	177	14	53
148	150	10	57	178	178	9	56
149	151	8	28	179	179	4	58
150	152	5	51	180	180	0	0

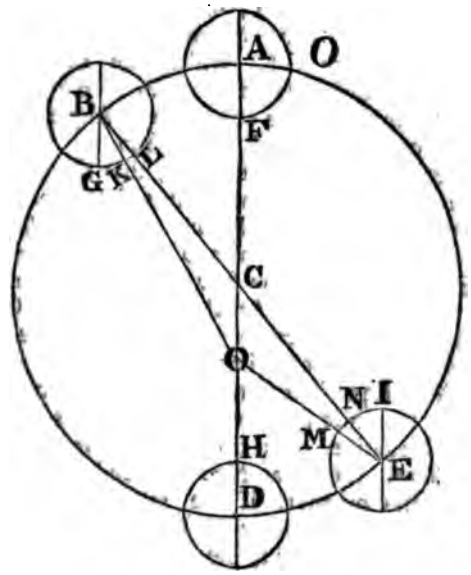
Sun's Place.	R. Aſcenſion. °	′	″	Sun's Place.	R. Aſcenſion. °	′	″
♋181	180	55	2	♌211	208	51	32
182	181	50	4	212	209	49	3
183	182	45	7	213	210	46	44
184	183	40	10	214	211	44	33
185	184	35	15	215	212	42	32
186	185	30	22	216	213	40	41
187	186	25	31	217	214	38	59
188	187	20	42	218	215	37	28
189	188	15	55	219	216	36	6
190	189	11	11	220	217	34	55
191	190	6	30	221	218	33	54
192	191	1	53	222	219	33	3
193	191	57	20	223	220	32	22
194	192	52	51	224	221	31	53
195	193	48	26	225	222	31	24
196	194	44	6	226	223	31	26
197	195	39	51	227	224	31	29
198	196	35	40	228	225	31	43
199	197	31	35	229	226	32	7
200	198	27	36	230	227	32	43
201	199	23	44	231	228	33	30
202	200	19	58	232	229	34	28
203	201	16	18	233	230	35	36
204	202	12	46	234	231	36	55
205	203	9	20	235	232	38	25
206	204	6	2	236	233	40	6
207	205	2	52	237	234	41	58
208	205	59	49	238	235	44	0
209	206	56	55	239	236	46	16
210	207	54	9	240	237	48	36

Sun's Place.	R. Aſcenſion. ° ′ ″	Sun's Place.	R. Aſcenſion. ° ′ ″
♈241	238 51 9	♎271	271 5 25
242	239 53 52	272	272 16 50
243	240 56 36	273	273 16 14
244	241 59 49	274	274 21 36
245	243 3 1	275	275 26 56
246	244 6 23	276	276 32 15
247	245 9 54	277	277 37 30
248	246 13 33	278	278 42 43
249	247 17 21	279	279 47 52
250	248 21 18	280	280 52 57
251	249 25 22	281	281 57 57
252	250 29 53	282	283 2 53
253	251 33 53	283	284 7 44
254	252 38 19	284	285 12 29
255	253 42 52	285	286 17 8
256	254 47 31	286	287 21 21
257	255 52 16	287	288 26 7
258	256 57 7	288	289 30 27
259	258 2 3	289	290 34 38
260	159 7 3	290	291 38 42
261	260 12 8	291	292 42 39
262	261 17 17	292	292 46 27
263	262 22 30	293	294 50 6
264	263 27 45	294	295 53 37
265	264 33 4	295	296 56 59
266	265 38 24	296	298 0 11
267	266 43 46	297	299 3 14
268	267 49 1	298	300 6 8
269	268 54 35	299	301 8 51
270	270 0 0	300	302 11 24

Sun's Place.	R. Aſcenſion. °	′	″	Sun's Place.	R. Aſcenſion. °	′	″
♒301	302	13	47	♓331	333	3	5
302	304	16	0	332	334	0	11
303	305	18	2	33	334	57	8
304	306	19	54	334	335	53	58
305	307	21	35	335	336	50	30
306	308	23	5	336	337	47	14
307	309	24	24	337	338	43	42
308	310	25	32	338	339	40	2
309	311	26	30	339	340	36	16
310	312	27	17	340	341	32	24
311	313	27	53	341	342	28	25
312	314	28	17	342	343	24	20
313	315	28	31	343	344	20	9
314	316	28	34	344	345	15	54
315	317	28	26	345	346	11	34
316	318	28	7	346	347	7	9
317	319	27	38	347	348	2	40
318	320	26	57	348	348	58	7
319	321	26	6	349	349	53	30
320	322	25	5	350	350	48	49
321	323	23	54	351	351	44	5
322	324	22	32	352	352	39	18
323	325	21	1	353	353	34	29
324	326	19	19	354	354	29	38
325	327	17	28	355	355	24	45
326	328	15	27	356	356	19	50
327	329	13	16	357	357	14	53
328	330	10	57	358	358	9	56
329	331	8	27	359	359	4	58
330	332	5	51	360	360	0	0

On account of the Sun's Eccentricity, C ☉ 1692, from the Center of the Earth's Annual Orbit, the Diurnal Motion of the Earth is ſometimes faſter, and ſometimes ſlower than the Mean Motion 59′ 8″; and conſequently the Apparent Day is ſometimes longer, and ſometimes ſhorter than the Mean Day: Which Inequality, and the quantity of the Difference of the Equal or Mean Day from the Apparent, is thus demonſtrated:

In the following Figure, let A B D E be the Great Orb, in which the Earth is yearly carried about the Sun; the Center hereof is C, A, the Aphelion, or the Earth's Place at Noon on that Day that it is in its Aphelion, ſuppoſe the 18th of *June*, B the Earth's Place at Noon the following Day; A F an aſſigned Meridian of the Earth; the Arch A B, or the Angle A C B; the Mean Motion of the Earth 59′ 8″ from the Noon of the given Day, to the Noon of the Day following; F a Point in the given Meridian turn'd to the Sun; which Point while the Earth is carried in its Orb from A to B, is roll'd by the diurnal Circumvolution of the Earth from F thro' O the firſt Day, to G the ſecond Day; to which Place when the ſaid Point arrives, 'tis manifeſt that the Earth has perform'd a Compleat Revolution about its own Axis; becauſe the Meridian B G, in the ſecond Day's Poſture, is made parallel to A F, its firſt Day's Poſture: But it is not yet apparent Noon, till the ſame Point of the Earth, by its Revolution be brought to K, where



where 'tis turn'd directly to the Sun, who governs the Civil Days.

And that this time is not the ſame with the Celeſtial or Equal Noon, will be prov'd, not only becauſe the Earth has not yet performed its Mean Motion above its Revolution (tho' this were a ſufficient Argument,) but alſo becauſe the diurnal Motions about the Sun, and conſequently the Returns of any certain Meridian to him, are very unequal: Neither can that poſſibly be equal, in reſpect of any Point, about which the Earth is carried equally; as is ſufficiently manifeſt from the Inſpection of the Scheme only. Wherefore the Mean Noon and Equal Time reſpect the Point of the Mean Motion, (that is, the Center of the Orbit at C) and in our preſent Inſtance, is then, when the Meridian carried from K, arrives at L, where it is directly turn'd to the Center of the Orbit at C. And when it has gained this Poſture, the Earth has performed its Mean Motion above a Revolution requiſite to compleat a Mean Day.

For the Arch G L, or the Angle G B L is equal to the Angle A C B, the Mean Diurnal Motion of the Earth. Alſo the Arch G K, which the Earth, or any Meridian therein, muſt paſs more than a Revolution, before it be Apparent Noon, is equal to the Angle A ☉ B, the Apparent Motion of the Earth at the Sun.

From whence 'tis evident, that the Arch K L, which the Circumference of the rolling Earth performs between the Apparent and Mean Noon, and which ſhews the Difference between the Apparent and Mean Day, is equal to the Angle ☉ B C, which is the Equation of the Orbit.

Wherefore the *Proſthaphæreſi* of the Orbit reduced into Minutes and Seconds of Time, ſhall be the ſecond part of the Equation of Time derived from the Earth's Motion. Which Equations throughout this Semicircle of the Orbit (that is, while the Mean Anomaly is 0, 1, 2, 3, 4, 5 Signs) are Negative, or to be ſubtracted from the Apparent Time; for herein the Mean Noon ſucceeds the Apparent.

In like manner, if we take the oppoſite Place of the Scheme, and conſider the Earth in its Perihelion, the Point I, or the Meridian E I, being made parallel to its Yeſterday's Poſture, 'tis plain, that the Earth has performed one compleat Revolution.

This Point being carried to N, where 'tis turned to the Center of the Orbit, 'tis now Mean Noon: For the Arch N I, or the Angle N E I, equal to the mean diurnal Motion

of

Earth, is paſſed over. But it is not yet Apparent
ll the Earth, by its Rotation, brings the ſame Me-
o M, where it is directly turned towards the Sun.
hence 'tis manifeſt, that the Apparent Day exceeds
n by ſo much time as is requiſite for the Earth to
Arch N M; which Arch is equal to the Angle
the *Proſthaphæreſis* of the Orbit. Wherefore redu-
into Time, gives the Equation of Natural Days, in
f the Earth's Motion, which throughout this Semi-
Anomaly (*i. e.* while the Earth moves from her Pe-
to her Aphelion) is Affirmative, or to be added to
rent Time; becauſe herein the Mean Noon precedes
rent.

anifeſt, from what goes before, that if the Sun were
enter of the Earth's Annual Orbit, and the Earth's
re not inclin'd to its Path, or Way, there would be
ality of Time; but the Mean Day and Apparent
e equal.

ver, if there were no Eccentricity of the Sun from
er of the Earth's Orbit, but there were the uſual
on of the Earth's Axis to the Orbit, or, as the *Peole-*
expreſs it, the Obliquity of the Ecliptic; then, E
ſecond part of the Equation of Time would vaniſh,
would be only the firſt part of the Equation, which
retain'd by all the ancient Aſtronomers.

ng now ſhewn and demonſtrated, that the Equation
depends on two Cauſes; and in the Firſt Part hav-
finiſh'd, and brought into a Practical Table, which
e in Page 2, of my *Aſtronomical Tables*; it is now my
neſs to reduce the Second Part into a Practical Ta-
which will compleat the whole Equation of Time.

ſt. I ſhall ſhew the greateſt Elliptic Equation of the
Orbit, according to ſeveral Authors which are come.

	°	′	″
y, *Claudius* in *Mullerus*	2	23	00
ſus, King of *Caſtile*, in *Mullerus*,	2	10	00
Newton. in his Math. Inſtitutions.	2	04	47
Kepler. *Rudolphin*, — — —	2	03	46
s Duret — — — —	2	03	46
n Leyburn, in his *Curſus Mathem.*	2	03	42
Brahe, — — — —	2	03	15
us Maginis, in his *Ephemerides*,	2	03	12

Ed.

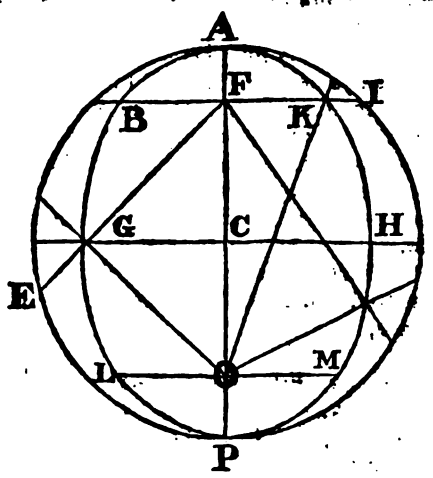
	°	′	″
Edward Wright, in his Errors of Navigation,	2	03	08
V Wing's Harmonicon Inſtr. & Brit.	2	02	56
Bullialdus,	2	02	48
Jer. Shakerly,	2	02	48
J. Gadbury from *ditto*,	2	02	48
J. Newton Decimal Tables,	2	02	40
T. Street,	1	59	06
N. Greenwood from *ditto*,	1	59	06
Jeremy Horrox,	1	59	00
J. Wing in his *Scientia Stellarum*,	1	57	30
William Leybourn in his Inſtitutions,	1	57	00
Sir *Iſaac Newton* in his Theory of the Moon,	1	56	20
Mr. *Whiſton* in his Lectures,	1	56	20
Mr. *Hodgſon* in his Syſtem,	1	56	20
My Tables, in my Syſtem,	1	56	20
P. H. Le la Hire,	1	55	42
Mr. *John Flamſteed*,	1	55	00
N. Copernicus in *Mullerus*,	1	50	41

By which it will appear, that if theſe ancient Aſtronomers had had any Notion of the Earth's Motion, they might have prov'd their Tables by the going of a good Pendulum-Clock: For *Ptolemy*'s greateſt Equation turned into Time, is 9′ 32″, which is 1′ 47″ too much; and *Copernicus* is 22″ 36‴ too little. The greateſt Elliptic Equation in my Tables is found thus:

As G ☉ Mean Diſt. ☉ à ☉	100000	5.000000
To Radius	90° 0′	10.000000
So C ☉ Eccentricity	1692,	3.228400
To S. ∠ C G ☉	58′ 10″	8.228400

Doubled, is = ∠ F G ☉ 1° 56 20; which ſubtract in the firſt Semi-circle, and add in the ſecond, as is plain in the following Figure.

in any other part of the Orb, it will require a further
ation to find
an & True
lies (which
: ſhewn in
per place)
difference
Elliptic E-
, and makes
Table in
8, 29, and
my *Aſtrono-*
hich Table
educed in-
e, are the
rs in Page
my *Aſtrono-*
l is what is
he Second



f the Equation of Time, depending on the
ccentricity: And this anſwers to every Degree of
Anomaly, whoſe Uſe you will find in *Precept* 2, Page
my *Syſtem*.

are therefore demonſtrated two ſorts of Equation of
ariſing from two different Cauſes: If they are both
dded, or both to be ſubtracted, their Sum is to be
or ſubtracted; but if one be to be added, and t'other
ted, their difference, according to the nature of the
k, is to be added or ſubtracted to or from the Apparent
the Mean.

r clearing the Theory of this Doctrine, I come next
ly it to Practice, in regulating curious Time-keepers;
indeed are very often abuſed, for want of the due
eration and right Application of this Equation of

For at ſome times of the Year it happens, that if
atches, or oſcillating Pendulums do not differ above a
r of an Hour from the Time ſhew'd by the Sun or
they are falſe, and need a Correction. And the rea-
this is plain: For if a Pendulum-Watch goes true,
equal; that is, one twenty four Hours at any time of
ar, is as long as another twenty four Hours at any o-
me of the Year, and this perpetually and conſtantly;
s, all Watches that go true, meaſure the Equal or Mean
and conſequently differ from the Apparent Time
ſhewn

ſhewn by a Sun-Dial or other Inſtrument, as much as is the Equation of Time in Exceſs or Defect.

There are only four Days in the Year on which the Equation of Days ceaſe; that is, the Apparent and Mean Time are then the ſame, *viz.* *April* 4, *June* 6, *Auguſt* 20, and *December* 13. If to any of theſe Days we ſet a well regulated Pendulum Watch to the Apparent Time ſhewn by the Sun or Stars, on any Day afterwards it ought to differ from this Apparent Time, ſo much as the Equation of Time is in the Table.

Alſo there are four Days in the Year in which there are the greateſt difference between the Sun and the Clock; and thoſe are,

Jan. 30,	Equation 14′ 49″		Clocks too faſt.
May 3,	4 5		Clocks too ſlow.
July 15,	5 55		Clocks too faſt.
Octob. 23,	16 12		Clocks too ſlow.

By which it appears, that from *April* 4, to *June* 6, the Equation muſt be added to the Equal Time, to give the Apparent; from *Auguſt* 20, to *December* 13, the Equation is again added to the Equal Time, to gain the Apparent; but from *December* 13 to *April* 4, it is to be ſubtracted. But if you would reduce the Apparent Time to the Equal, you muſt uſe the contrary Titles; that is, now ſubtract, where you there added. Therefore in regulating curious Time-keepers for Aſtronomical uſe, you moſt always obſerve, that they differ from the Time obſerved by the Sun or Stars, ſo much as is the Equation of Time for that Day. As, ſuppoſe *July* 8, the Equation is 5′ 40″ Clocks too faſt; therefore this Equation is to be ſubtracted from the Time ſhewn by the Sun or Stars: But if the ſame Equation be added to the Apparent Time ſhewn by the Sun, the Sum will be the Equal Time ſhewn by the Clock.

Wherefore if at any time we ſet our Pendulum Watch, in order to rectifie it, and bring it exactly to meaſure the Mean Day, we are to add or ſubtract from the Apparent Time ſhewn by the Sun, ſo much as is the Equation of Days at the time we ſet it.

For Example; at Noon, or juſt when the Sun is on the Meridian, that is, when the Apparent Time is exactly 12 a-Clock the 8th Day of *July* I ſet my Watch, the Equation is then 5′ 40″ add to the Apparent Time: Wherefore I ſet my

my Watch to 12 h. 5′ 40″; which, if it go right, that is, equally, as it ought, on the 8th day of *Auguſt* will be 3′ 13″ before the Sun: If it be either more or leſs, behind or before the Sun, it has gone falſe, and is to be rectified, either by lengthening or ſhortening the Pendulum as much as is requiſite to make it gain or loſe the difference between 3′ 13″ before the Sun, and its Error, whatever it is in 31 Days time elapſed, between the 8th of *July* and the 8th of *Auguſt*. But if at any other time of the Year, we ſet our Watches when the Equation is to be ſubtracted, we muſt put it ſo much behind the Sun as is the Equation for that Day. But this is plain enough without any further Illuſtration.

Of the Certainty and Exactneſs of this Equation of Time, I have made many moſt convincing Experiments; and becauſe it is neceſſary to underſtand how to lengthen or ſhorten the Pendulum, in order to make the Clock go equal Time the Year round, I ſhall lay down this following Rule.

The Lengths of Pendulums are to each other reciprocally as the Squares of their Vibrations in the ſame time.

Thus, if a Pendulum 39.2 Inches long vibrates 60 times in a Minute, how oft will a Pendulum 9.8, (*viz.* a quarter of 39.2) Inches vibrates in a Minute?

As the Length of the ſhorteſt Pendulum 9.8,
To the Length of the other Pendulum;
So are 3600, the Seconds in a Minute, to a Fourth Number, whoſe Square Root are the Vibrations in a Minute of the ſhorter Pendulum.

OPERATION.

```
                60'
Length P.       60      Length Pend.
As 9.8:         3600  : :   39.2
                              3600
                            ------
                            235200
                            1176
                            ------
                      9.8) 141120.0 (14400 (120"
                           ....  : 1
                           98      -----
                           ------  22) 44
                           431       44
                           392      -----
                           ------     00
                             00
```

Answer. 120 Vibrations in a Minute, of that Pendulum whose Length is 9.8.

Secondly, If it be demanded, how oft a Pendulum 43.5 Inches long vibrates in a Minute, the Analogy is this:

```
Pend.      "      Pend.
As 43.5 : 3600 : : 39.2
                   3600
                 ------
                 235200
                 1176
                 ------
          43.5) 1411200 (3244 (57" fesè.
                 ....   25
                1305
                ------  ------
                 1062  107)744
                  870     749
                 ------  ------
                  1920
                  1740
                 ------
                   1800
                   1740
                  ------
                     60
```

And

And seeing each Vibration of the Pendulum in a Clock adapted for it, sets the Hand forward a Second; by knowing the Number of Vibrations which a Pendulum 43.5 Inches long performs in a Day less than a Pendulum 39.2 Inches long, we may know the Number of Seconds which it will slacken the Index of the Clock less than 39.2 Inches long.

Contrarily, Let it be required, to find the Length of a Pendulum, which shall make any assign'd Number of Vibrations in a Minute?

As for Example: Let the Number of Vibrations be 57, Length of a String counted from the Point of the Suspension, to the Center of Oscillation, or of the Bullet or round Ball at the End of it, is required?

Since the Lengths of Pendulums are to each other as the Squares of their Vibrations; therefore it will hold, As the Square of the Number of Vibrations, are to the Length of the Pendulum 39.2, which vibrates Seconds; So is the Square of 60, the Seconds in a Minute, To the Length of the Pendulum requir'd.

OPERATION.

57 60
57
60
399
285

P.

As 3249 : 39.2 : : 3600
3600

235200
1176

3249) 141120.0 (43.4 Inches, Length of Pend. req'd.
12996

What I have given on this Head, may be of excellent use, both to Regulate the Motion of a Clock or Watch, and exactly to measure Time without either; which may

gratifie and aſſiſt the curious Aſtronomer in obſerving Eclipſes, eſpecially thoſe of the Satellites of *Jupiter*, and in the Tranſits of the Moon under the Fixed Stars, and her Occultations of them, whoſe Duration may be meaſured, without Clock, Watch, or any ſuch Way of diſtinguiſhing Time.

And here let the Reader obſerve, that Pendulums of the ſame Length do not, in different Places on the Globe, make their Vibrations in the ſame time; but towards the Poles, where the Gravity is ſtrongeſt, they move quicker than near the Equator, where they are leſs impelled to the Center: And accordingly, Pendulums that meaſure the ſame Time by their Vibrations, muſt be ſhorter near the Poles, than at a greater diſtance. Both which Deductions are found to be true in fact; of which Sir *Iſaac Newton* has recounted particularly ſeveral Experiments; in which it was found, that Clocks exacted, adjuſted to the true Meaſure of Time at *Paris*, when tranſported nearer to the Equator, became erroneous, and mov'd too ſlow; but were reduced to their true Motion, by contracting their Pendulums.

Sir *Iſaac* was particular, in remarking how much they loſt of their Motion, while the Pendulums remain'd unalterable; and what Length the Obſervers are ſaid to have ſhortned them, to bring them to Time.

And the Experiments which appear to be moſt carefully made, ſhew the Earth to be raiſed in the Middle between the Poles about ſeventeen Miles, which is cauſed by its Rotation upon its own Axis.

CHAP.

CHAP. II.

How to obſerve the Sun's Ingreſs into any Point of the Ecliptic.

FOR this purpoſe you muſt be provided with an exquiſite Aſtronomical Quadrant; by which you may take an Altitude to Seconds; and from that you muſt truly determine the Elevation of the Pole at the Place of your Habitation. Then take the Sun's Meridional Altitude on the Day you think the Sun may be near that Point of the Ecliptic which you are ſeeking; and alſo on the Day following, if poſſible, or as ſoon as you can, take his Meridional Altitude a ſecond time; and by theſe two Meridional Altitudes you will diſcover whether he is ſhort, or paſt the Point of the Ecliptic which you are ſeeking. By theſe two Meridional Altitudes, and the Latitude of the Place of Obſervation, you may find the Sun's Declination, and conſequently his true Longitude, anſwering, as I have taught in my *Compleat Syſtem of Aſtronomy*. Then, if one Altitude be ſhort, and the other paſt the Point of the Ecliptic ſought, add the two Places agreeing to thoſe Altitudes, together, and ſay, As the Sum of thoſe two Longitudes, or Diſtance of the Sun from the Point of the Ecliptic ſought, Is to the Space of Time between the Two Obſervations; So is the Diſtance of the Sun from the Point of the Ecliptic ſought, To a proportional Part of the Time; which added to the Time of the Firſt Obſervation, will give the Time the Sun is in the Point of the Ecliptic ſought.

But if the Obſervations are both taken when the Sun is either ſhort, or paſt the Point of the Ecliptic, then, inſtead of the Sum of the Sun's Longitudes, you muſt take the Difference, and ſay as before: And if the Declination at the time of the firſt Obſervation be leſs than the Declination of time of the ſecond Obſervation, the proportional part of the time muſt be ſubtracted from the time of the firſt Obſervation. But if the Declination at the time of the firſt Obſervation be more than the Declination at the time of the ſecond Obſervation, then the proportional

tional part of time muſt be added to the time of the firſt Obſervation, and you will gain the time of the Sun entring that part of the Ecliptic ſought.

Example. *Anno* 1727, at *London* I obſerved the Sun's Meridian Altitude, *March* 9, to be 38° 12′ 56″; and *March* 10, next following, I obſerved his Meridian Altitude to be 38° 36′ 38″. I demand the exact time of the Solar Ingreſs into the Equinoctial Sign *Aries*?

OPERATION.

1. For the Place of the Sun, anſwering the firſt Obſervation.

			° ′ ″	
Sun's Meridian Altitude obſerved			38 12 56	Subt.
Altitude of the Equator at *London*,			38 28 00	from
Remains Sun's Declination South,			00 15 04	
	°	′ ″		
As S. Obliquity	23	29 00	9.600409	
To S. Declination South	00	15 04	7.641594	
So Radius ---	90	00 00	10.000000	
To S. Long. ſhort of ♈	00	37 48	8.041185	
From	12S.	00 00 00		
☉'s true Place obſ.	11	29 22 12		

Note, Becauſe the Meridian Altitude of the Sun is leſs than Alt. Equat. proves Decl. to be South.

2. For the Place of the Sun's anſwering the ſecond Obſervation.

			° ′ ″	
Sun's Meridian Altitude obſerv'd			38 36 38	
Altitude of the Equator at *London*,			38 28 00	
Remains the Sun's Declination North			00 08 38	
	°	′ ″		
As S. Obliquity	23	29 00	9.600409	
To S. Declination North	00	08 38	7.399484	
So Radius ---	90	00 00	10.000000	
To S. Longitude paſt ♈	00	21 39	7.799075	

Hence

Hence it appears, that the time of the Vernal Equinox happen'd ſome time between the 9th and 10th days at Noon. Then to find out the preciſe time.

	D.	′	″	
Anno 1727 *March*	9 Sun ſhort of the Equinox	37	48	+
	10 Sun paſt the Equinox	21	39	
	Sun's Diurnal Motion, Sum	59	27	

Now ſay, by the Logiſtical Logarithms,

	°	′	″	L.
As Sun's Diurnal Motion	00	59	27	L. 40
To one Day, or	24	00	00	3979
So is Diſt. on the 9th day	00	37	48	2007
To the proportional Part	15	15	34	5946

Which is the true time of the Vernal Equinox, *viz.* *March* 10, 15′ 34″ paſt 3 in the Morning, by Obſervation; and agrees exactly with my Tables, which, for your ſatisfaction, you may try at your own leiſure.

And after this manner you may find the Time of the Sun's Entrance into any of the Twelve Signs, or into any Point of the Ecliptic deſired, by taking Two Meridional Altitudes near the time in a known Latitude.

Example 2. *Anno* 1730, *June* 11, at *London*, I obſerved the Sun's Meridional Altitude to be 61° 56′ 54″; and *June* 12, I obſerved it to be 61° 56′ 26″. I demand the time of the Sun's Ingreſs into the Tropical Sign *Cancer*?

OPERATION.

	°	′	″
Sun's Merid. Altit. obſerv'd *June* 11, was	61	56	54
Altitude of the Equator at *London*	38	28	00
Remains the Sun's Declination North	23	28	54

		o ' "	
As S. Obliquity		23 29 00	9.600409
To S. Declination		23 28 54	9.600382
So Radius	----	90 00 00	10.000000
To S. Longitude à ♎		89 21 41	9.999973
From	----	180 00 00	
Remains	----	90 38 19	=3S. 0° 38' 19" (Sun's Place.

2. For the Sun's Place, anſwering the ſecond Obſervation,

	o ' "
Sun's Meridional Altitude obſerved	61 56 26
Altitude Equat. at *London*	38 28 00
Remains Sun's Declination North	23 28 26

		o ' "	
As S. Obliquity		23 29 00	9.600409
To S. Declination		23 28 26	9.600241
So Radius	----	90 00 00	10.000000
To S. Longitude		88 24 28	9.999832
From	---	180 00 00	
Remains	---	91 35 32	=3S. 1° 35' 32" ☉'sPl.

Hence it appears, that the Sun is paſt the Solſtice at both the Obſervations. Therefore,

			S.	o	'	"
☉'s Place obſerved	12 / 11	Day is	3	1	35	32
			3	0	38	19
Sun' Diurnal Motion				0	57	13

Now ſay,

If ☉'s Diurnal Motion	00 57 13	— 206 *Co.Ar.*	794	
Give One Day or	24 00 00	3979 ?	3979	
What will firſt Obſerat.	00 38 19	1948 S	1948	
Anſwer, Sub.	16 4 15	5721	5721	
From the Day on firſt Obſ.	24 00 00			
Sun in ♋ *June* 10	7 55 45	Apparent Time.		

By theſe Examples the young Tyro may find by Obſervation, when the Sun apparently enters any Sign of the Ecliptic; by which he may examine the Solar Tables, whether they

they correſpond with the Obſervations of the preſent Age; as you will find mine exactly to agree, the Obſervations being made with a new-invented Quadrant of Braſs, anſwering to a Radius of 270 Feet.

CHAP. III.

An Inveſtigation of the Earth's Aphelion *and Annual Inequality.*

ANNO 1726, *April* 29, at *London*, I obſerv'd the Sun's Altitude on the Meridian 56° 5′ 16″; *July* 13, following, 58° 24′ 34″, and *September* 8, the ſame Year, 39° 59′ 55″; by which Meridional Altitudes corrected by Parallax and Refraction, with the Obliquity of the Ecliptic 23° 29′, and the Latitude of *London* 51° 32′ North, the three Longitudes of the Sun are determin'd as follows.

	°	′	″
Sun's Merid. Alt. in the firſt Obſervation	56	5	16
Elevation of the Equinoctial at *London* Sub.	38	28	00
Remains the Sun's Declination North,	17	37	16

Now, for the Sun's Place, ſay,

	°	′	″	
As S. of the Obliquity	23	29	00	9.600409
To S. Declination	17	37	16	9.481040
So Radius ---	90	00	00	10.000000
To S. Longitude from ♈	49	26	10	9.880631
That is, in ♉	19°	26′	10″.	

2. For

2. For the Sun's Place in the ſecond Obſervation.

	° ′ ″
Sun's Meridian Altitude	58 24 34
Elevation of the Equin. at *London* Sub.	38 28 00
Remains the Sun's Declination North	19 56 34

Now for his Place anſwering.

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination	19 56 34	9.532909
So Radius	90 00 00	10.000000
To S. Longitude	58 52 34	9.932500
From ----	180 00 00	
Remains ----	121 7 26 = 4S. 1° 7′ 26″	☉'s Pl.

3. For the Sun's Place in the third Obſervation.

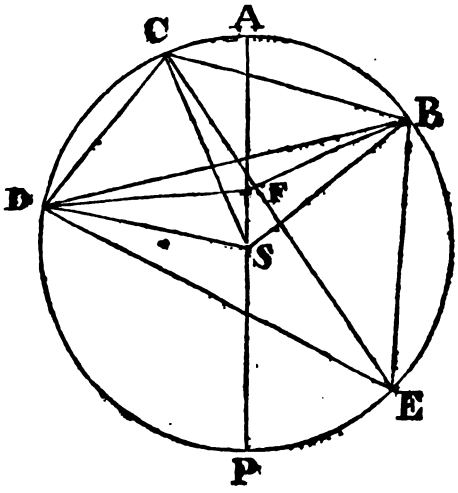
	° ′ ″
Sun's Meridian Altitude ----	39 59 55
Elevation of the Equinoct. at *London* Sub.	38 28 00
Remains the Sun's Declination North	1 31 55

Now for his Place anſwering.

	° ′ ″	
As S. Obliquity	23 29 00	9.600409
To S. Declination	1 31 55	8.427114
So Radius	90 00 00	10.000000
To S. Longitude	3 49 50	8.826705
From ----	180 00 00	
Remains	176 10 10 = 5S. 26° 10′ 10″	☉'s Pl.

In the adjacent Diagram, let S repreſent the Sun; on which, as a Center, deſcribe the Circle, whoſe Radius is equal to the Tranſverſe Diameter of the Earth's Ellipſis; draw the Diameter A P, and lay off the Sun's Place obſerved at B C and *D*, by help of the Sector; and draw *S D*, *S B*, *S C*; and alſo from F the upper Focus, draw *F D*, *F B*, *F C*; continue *C F* to *E*, and draw *B C*, *C D*, *D E*, and *E B*: Then be-

becauſe the Angles FBS, FCS, and FDS are equal to half the Elliptic Equation, all the Angles at F and S are known from the times between the Obſervations, as follows; according to the Method of *Petrus Herigonus*, Profeſſor of Mathematicks at *Paris* 1644. From the firſt Obſervation to the ſecond, are 75 days, as appears from this Work.



April	30					
Day obſerv'd	29					
					°	′	″
April	1	Sun's Place	*April* 29 = ♉	19	26	10
May	31		*July* 13 = ♌	1	7	26
June	30		Difference	2	11	41	16
July	13						
Days	75		between the firſt and ſecond Obſervation,				

and is the Sun's apparent Motion for 75 Days = ∠ *B S C*.

This done, take out of my Aſtronomical Tables the Middle Motion of the Sun for 75 days; which reckoned from the beginning of *January*, will fall upon *May*. 16, Mean Mot. ☉ anſwering — — — 2S. 13°. 55′ 24″
Appar. Mot. ☉ equal to the Arch B A C + 2 11 41 16

Sum.	4	25	36	40
Half Sum is the Angle B F C	2	12	48	20

Or ſubtract the Mean Motion ☉ for *April* 29, from the Mean Motion for *July* 13, and the Remainder will be 13°. 55′. 24″, as above.

2. From

2. From the ſecond Obſervation to the third, are 57 days found thus:

July has Days — —	31
The ſecond Obſervation made the	13 Day.
Remain Days in *July*	18
Auguſt	31
September	8
Days	57

Sun's Place obſerv'd	*July* 13 =	4 S.	1°	7′	26″
	Sept. 8 =	5	26	10	10
Diff. is ☉'s Apar. Mot.		1	25	2	44 = ∠ *C S D.*
Mean Mot. ☉ in 57 days add		1	26	10	55 = *Feb.* 25.
Sum		3	21	13	39
Half		1	25	36	49 = ∠ *C F D.*

3. From the firſt Obſervation to the third, are 132 Days.

April has 30 Days.
Obſerv'd 29

Remains 1 Day in *April.*

		S.	°	′	″
In *April* 1 Day	Suns Place *April* 29 =	1	19	26	10
May 31	obſerv'd *Sept.* 8 =	5	26	10	10
June 30					
July 31	Diff. is ☉'s App. Mot. = ∠ *BSD*	4	6	44	00
Aug. 31	Mean Mot. in 132 D. = *May* 12	4	10	6	19
Sept. 8	Sum	8	16	50	19
Sum 132 Days	Half is = ∠ *B F D*	4	8	25	9½

Note, Suppoſing the Logarithm of *F D* 10.000000; then in the Triangle *D E F* are given, (1.) the Radius *D F*, whoſe Logarithm is 10.000000. (2.) the Angle *D F E* 124° 23′ 11″ the Complement of the Angle *C F D* 55° 36′ 49″. (3.) the Angle

Angle D E F 27° 31′ 22″, it being half the Angle of *D S C* 55° 2′ 44″, by *Euclid* 20, 3. To find F *E*, *Note*, The Angle *C S D* is the Quantity of the Sun's apparent Motion, from the ſecond to the third Obſervation.

	°	′	″	
As S. ∠ *D E F*	27	31	22	9.664737
To Radius	90	00	00	10.000000
So S. ∠ *F D E*	28	5	27	9.672901
To F E —			—	10.008164

	°	′	″
∠ *D F E*	124	23	11
∠ *D E F*	27	31	22
Z	151	54	33
From	180	00	00
∠ *F D E*	28	5	27

2. In the Triangle *F E B* are known, (1.) *F E* juſt now found. (2.) the Angle F E B 35° 50′ 38″, it being half of the Angle *B S C* 71° 41′ 16″, the apparent Motion of the Sun from the firſt to the ſecond Obſervation. (3.) the Angle B F E 107° 11′ 40″, it being the Complement of the Angle B F C 72° 48′ 20″, to find F B.

	°	′	″		
As S. Angle F B E	36	57	42	Co. Ar.	0.220922
To F E —				—	10.008164
So S. ∠ F E B	35	50	38		9.767587
To F B					9.994673

	°	′	″
∠ E F B	107	11	40
∠ F E B	35	50	38
Z	143	02	18
From	180	00	00
∠ F B E	36	57	42

3. In

3. In the Triangle *D B F* are given, (1.) *F B*, juſt found; (2.) The Angle *D F B* 128° 25′ 9″ ½; (3.) The *D F*, to find the Angle *D B F*, and the Side *D B*.

This is the ſecond Axiom of Oblique-angled plain angles; which is, As the Sum of the two Sides, inclu the given Angle; Is to their Difference; *So* is the Tan of half the Sum of their oppoſite Angles, *To* the Tange half the Difference of the ſaid Angles: Which adde the half Sum of the oppoſite Angles, gives the greater A ſought; and ſubtracted, gives the leſſer. But in this C becauſe we have only the Logarithm of the Sides given, muſt work thus, *viz.*

To the Logarith. of *D F* 10.000000, add Radius 10.000 and from that Sum 20.000000, ſubtract the Logarithm of found in the laſt Operation, and that gives the Tangen an Arch; from which always ſubtract 45°, and note th maining Arch. See the Operation at large.

To Radius *D F*.	10.000000
Add the Logarithm	10.000000
Double Radius	20.000000
F B ſubt. —	9.994673
Tang. 45° 21′ 5″	10.005327
Sub. 45 00 00	
Rem. 00 21 5	
∠ *D F B*	128° 25′ 09″ ½
From	180 00 00
Z of ∠ ∠	51 34 50 ½
Half =	25 47 25 ¼

New ſay,

		°	′	″	
As Radius	---	90	00	00	10.000000
To ∧ of the remaining Arch		00	28	05	7.787634
So ſ. of half Z of oppoſ. Ang.		25	47	25	9.684136
To ſ. of half X of the Ang. +		00	10	11	7.471770
Sum is the ∟ *DBF*		25	57	36	

Half Z Oppoſit. ∟ ∟ 25° 57′ 25″
Half X ∟ ∟ 00 10 11

∟ *FDB* 25 37 14

Now, for the Side *DB* ſay,

	°	′	″	
As S. ∟ *DBF*	25	57	36	9.641219
To Radius = *DF*	90	00	00	10.000000
So S. ∟ *DFB*	51	34	50 ½	9.894030
To *DB*				10.252811

4. In the Triangle *DSB*, are known, (1.) *DB* juſt now found. (2.) The Angle *DSB* 126° 44′ 00″, it being the Sun's apparent Motion from the firſt to the ſecond Obſervation. (3.) The Angles *SDB* and *SBD* are both known to be the ſame Quantity; becauſe the Triangle is Iſoſceles, viz. *SD* and *SB* are equal; therefore the Angles they ſubtend, are alſo equal, being half the Complement of the Angle *DSB* to a Semicircle; to find *DS*.

	°	′	″		
As S. ∟ *DSB*	53	16	00	Co. Ar.	0.096136
To *DB*					10.252811
So S. ∟ *DBS*. ..	26	38	00		9.651648
To *DS*					10.000595

∟ *DSB*	126°	44′	
From	180	00	
Z of ∟ ∟	53	16	
∟ *SDB*	26	38	
∟ *SBD*	26	38	

5. In

5. In the Triangle F D S, are given, (1.) F D = Radius. (2.) D S juſt now found. (3) ∟ F D S, to find the Angle F S D, and F S: That is, as in the third hereof: The Logarithm of two Sides of a plain Triangle, and the Angle comprehended being given, to find the other Angles.

1. As the leſſer Side is to the greater; ſo is Radius to the Tangent of an Arch.

2. As the Tangent of 45°,
Is to the Tangent of the found Arch leſs 45°;
So is the Tangent of half the oppoſite Angles,
To the Tangent of half their Difference.

OPERATION.

As the leſſer Side *D F*		10.000000
To the greater *D S*	—	10.000595
So Radius —	—	10.000000
To the *t.* of the Arch	45° 2′ 21″	10.000595
Sub.	45 0 00	
Rem.	00 2 21	

Now ſay,

	° ′ ″	
As t. of —	45 00 00	10.000000
To t of the remaining Arch	00 02 21	6.826388
So t. half Z Op. ∟∟ at F and S	89 29 37	12.045137
To t. of half their X ſub.	4 15 16	8.871525

Rem. ∟ *F S D* the true Anom. 85 14 21 = 2*S.* 25° 14′ 21″.

∟ *S D B*	26°	38′	08″
∟ *F D B*	25	37	14
∟ *S D F*	1	00	46
From	180	00	00
∟∟ F & S	178	59	14
Half =	89	29	37

For

	For F. S. ° ′ ″	
As S. ∠ FSD	85 14 21	9.998499
To D F Radius	90 00 00	10.000000
So S. ∠ F D S	1 00 46	8 241975
To F S —		8 243476
Place of ☉ in the Ecl. Observation		5S. 26° 10′ 10″
The ∠ F S D to the Anom. sub.		2 25 14 21
Remains the ☉'s true Apogeon		3 00 55 49
And the Aphelion of the Earth		9 00 55 49

6. For the Eccentricity of the Earth in such Parts as her mean Distance from the Sun, is 100000, the Proportion is,

As D S, found in the 4 hereof	10 000595
To S F, found in the 5	8 233476
So is the mean Distance 100000	5 0000 00
To the Eccentr. Parts C F 1749	3 242881

This being corrected according to the following Scheme, will be equal to C K 1692.

7. To find the mean Anomaly.

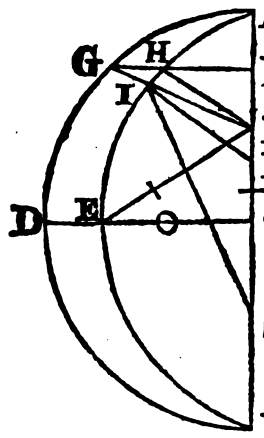
First, You are to observe (in all the Planets) that the difference between the true and mean Anomaly is the Elliptic Equation; which, in the first Observation is the Double of the Angle F B S; in the second, the double of the Angle F C S; and in the third, the double of the Angle F D S: But this way of Investigation stands in need of a Correction, as shall be shewn by and by. But first, for the mean Anomaly.

In the third Observation, the Angle F D S is 1° 0′ 46″; which doubled, is 2° 1′ 32″, the Equation; and the Angle F S D is the true Anomaly, 2S. 25° 14′ 21″; then what's the mean Anomaly?

True Anomaly = ∠ F S D		2S. 25° 14′ 21″
Double of ∠ S D F	add	2 1 32
Sum is the mean Anom. at the 3d Observ.		2 27 15 53

8. To correct the Elliptic Equation.

Let A H I E P be ſuppoſed the Semi-Ellipſis, and the Semicircle A G D P, deſcrib'd upon the Extreams of the Tranſverſe Diameter, the Ordinates C E and B H being extended to D and G, in the Periphery of the Circles: Then,



As C D: B G:: C E: B H.

Therefore,

As C E; C D:: ſ. B F H ſ. B F G.

But before we can clear up this Analogy, we muſt firſt ſhew how to find C E, the Semiconjugate of the Ellipſis, which is done thus:

In the Right-angled Triangle F C E, are given F E, the mean Diſtance of the Sun from the Earth 10.0000, and F C the Eccentricity 1692, to find C E, the ſemiconjugate Diameter; which is done by the 47th of the firſt of *Euclid*, thus:

Square of { E F		10000000000
{ C K		2862864
Remains	—	9997137136(99985=EC.

Now ſuppoſe the Sun at I in the Ellipſis; then will the Angle A F H be the Mean Anomaly, and in the third Obſervation equal to 2ſ. 27° 15′ 53″, A F G the correct Anomaly; draw I K parallel to H F; then is the Angle K I F = H F I the Variation; which in the firſt and fourth Quadrants of the Ellipſis are to be ſubtracted from the Elliptic Equation; but in the ſecond and third, added. So that in the third Obſervation above, the Sum is in the firſt Quadrant, and the Variation equal to the Angle K I F, is thus obtain'd:

As CE, the Semiconjugate		99985	4.999935
To CD, the Mean Diſtance		100000	5.000000
So ∂. ∠ AFH	85° 15′ 53″		11.320792
To ∂. ∠ AFG	87 15 54		11.320857
Difference is the Variat.	1 = ∠ KIF.		
Equat. found = ∠ SIF	2 1 32		
Abſolute Equation is	2 1 31 = ∠ SIK.		

But by a Repetition of the Work, I find in the third Obſervation,

	S. ° ′ ″	
The Mean Anomaly	2 19 52 45	
The Elliptic Equation	1 54 4	ſub.
Apogeon of ⊙	3 8 11 28	

And the Eccentricity 1692 Parts, ſuch as the Mean Diſtance of ⊙ from the Earth is 100000.

And in the firſt and ſecond Obſervations, as follows.

	Anom. S. ° ′ ″	*Equat.* ° ′ ″		*Apog.* S. ° ′ ″	*Eccentr.*
1.	10 9 46 50	1 28 15	+	3 8 11 57	1692
8.	0 23 42 00	0 45 52	−	3 8 11 28	

CHAP. IV.

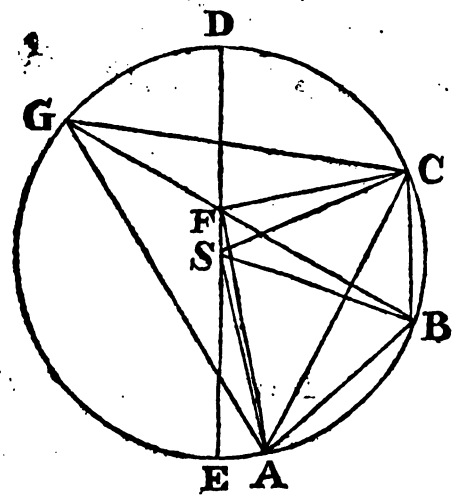
To find the Mean Anomalies, Eccentricities and Aphelions of the Three Superiour Planets.

TO do this, there muſt be had the true Equal Times of their being in Oppoſition to the Sun, and taken three ſeveral times in that Achronical Poſture, as follows:

Example. The equal times of three Oppoſitions of the *Sun* and *Mars*, taken at *London* by my ſelf, were as follows.

	d.	h.	′	″.		*Heliocentric Place of* ♂ ☉.	°	′		
Anno 1719 *Aug.*	16	10	48	36	A	11	3	55	27	From
1721 *Octob.*	24	14	32	13	B	1	12	37	49	Vernal
1723 *Dec.*	10	6	59	38	C	2	29	27	54	Equin.

Let S denote the Center of the Sun, F the other *Focus* of the Ellipſis of *Mars*; the Semidiameters of the Circle S A, S B, S C, being equal to the tranſverſe Diameters of the Ellipſis; and paſſing by his Places in the firſt Obſervation at A, in the ſecond at B, and the third at G; from which draw Lines to the Sun at S, and alſo to the *Focus* at F; continue B F to G, and draw the other Lines, as in the Figure.



1. From

1. From the first Observation to the second, the apparent Motion of *Mars* in the Arch A B is thus found:

		S.	°	′	″
Place of *Mars*	B	1	12	37	49
	A	11	3	55	37
Apparent Motion	A B	2	8	42	12

From *August* 16, at 10 h. 48′ 36″, 1719, to *October* 25, 1721, at 32′ 13″ past 2 in the Morning, is two Years compleat, and 69 d. 3 h. 43′ 37″.

OPERATION.

	D.	°	′	″		
August has	31	00	00	00	*Jan.*	31
First Observation	16	10	48	36	*Feb.*	28
					Mar.	10
Remains	14	13	11	24		
September	30	00	00	00	Days	69
October	24	14	32	13		
Time —	69	03	43	37	over and above 2 Years	

Now, from my Astronomical Tables of the Middle Motion of *Mars*, collect his Mean Motion, as follows.

	S.	°	′	″
Two Years compleat	0	22	34	19
Mar. 10 = 69 Days Motion	1	06	09	39
Hours 3 — —			3	56
Minutes 43 — —				56
Seconds 37 — —				1
Mid. Mot. from the first to 2*d* Obs.	1	28	48	51
Apparent Motion = Arch A B	2	08	42	12
Sum	4	07	31	03
Half = ∠ A F B —	2	03	45	31½

2. From the ſecond Obſervation to the third, the Motions of *Mars* are gain'd,

		S.	°	′	″		
Place of *Mars*	C	3	29	27	54		
	B	1	12	37	49		
Appar. Mot. = B C		1	16	50	05	*Jan.* 31 *Feb.* 15	
October has		31	00	00	00	Days	46
Second Obſerv. was		24	14	32	13		
Remains		6	09	27	47		
November		30	00	00	00		
December		10	06	59	38		
Time		46	16	27	25	over and above (two Years.	
Two Years compleat		00	22	34	19		
February 15		00	14	06	28		
Hours 16				20	58		
Minutes 27					35		
Seconds 25					1		
Mean Mot. from 2*d* to 3*d*		1	17	02	21		
Appar. Mot. = B C		1	16	50	05		
Sum		3	03	52	26		
Half is = ∠ B F C		1	16	56	13		

The Arch	A B	68°	43′	1″	The ∠	A F B	63°	45′	31″
	B C	46	50	15		B F C	46	56	13
Sum		115	32	27	The ∠	C F A	110	41	44
		360	00	00					
Arch CDGA		244	27	33					

Now ſuppoſe the Logarithm of CF to be 10.000000.

1. In the Triangle CFG are given (1.) the ∠ CFG 133° 3′ 47″, it being the Complement of the ∠ BFC to a Semicircle. (2.) the ∠ CGF 23° 25′ 2″ being half the Angle at the Center BSC 46° 50′ 5″. (3.) CF, its Logarithm as above, requir'd FG?

As S. ∠ CGF	23° 25′ 2″	9.599254
To Radius CF	90 00 00	10.000000
So S. FCG	23 31 11	9.601043
To FG		10.001789

CGF	23° 25′ 2″
CFG	133 3 47
Z	156 28 49
	180 00 00
FCG	23 31 11

2. In the Triangle *FAG* are given, (1.) *FG* juſt now found. (2.) The Angle *FGA* 24° 21′ 6″, it being half the Angle at the Center *ASB* 68° 42′ 12″, the apparent Motion from the firſt to the ſecond Obſervation. (3.) The Angle *AFG* 116° 14′ 29″, it being the Complement of the Angle *AFB* 63° 45′ 31″ to a Semicircle, to find FA?

OPERATION.

As S. ∠ FAG	29° 24′ 25″ Co Ar.	0.308911
To FG	---	10.001789
So S. ∠ FGA	34 21 6	9.751518
To FA	---	10.062218

AFG	116° 14′ 29″
FGA	34 21 6
Z	150 35 35
From	180 00 00
FAG	29 24 25

3 In the Triangle CFA are given, (1.) FA, juſt now found. (2) CF = to Radius. (3.) The Angle CFA 110° 41′ 44″, being the equal Motion of *Mars* from the firſt to the third Obſervation, to find the Angle *FAC* and the Side *CA*.

As the leſſer Side C F	—	10.000000
To the greater F A	—	10.062218
So Radius	—	10.000000
To t. of the Arch 49° 5′ 25″		10.062218
Sub. 45 0 00		
Rem. 4 5 25		

B F C	46°	56′	13″
A F B	63	4	31
C F A	110	41	44
From	180	00	00
Z L L	69	18	16
Half	34	39	08

As the t. of	45°	0′	0″ 10.000000
To t. of the rem. Arch	4	5	25 8.854351
So t. Z opp. ∠ L A & C	34	39	8 9.839607
To t half their X	2	49	47 8.693958
Rem. ∠ *F A C*	31	49	21
Sum is ∠ *F C A*	37	28	55

Now, for the Side *A C*.

As S. ∠ *F C A*	37°	28′	55 Co. Ar. 0.215732
To F A —			— 10.062218
So S. ∠ *C F A*	29	18	16 9.971031
To A C —			— 10.248981

4. In

4. In the Iſoſceles Triangle *C S A*, there are given *C A* ſt now found. (2.) The Angle *C S A* 115° 32′ 17″, requir'd 's)

OPERATION.

pparent Motions { *ASB* 68° 42′ 12
re the ∠ ∠ { *BSC* 46 50 5

CSA 115 32 17
from 180 00 00

Complem. 64 27 43, ½ is = 32° 13′ 51″ ½ is e ∠ at *SCA* and *SAC*; becauſe the Triangle is Iſoſceles.

As S. ∠ *SCA*	64° 27′ 43″	Co. Ar.	0.044649
To C A	---	---	10.248981
So S. ∠ *CAS*	32 13 51		9.726997
To C S	---	---	10.020627

5. In the Triangle FSC, are known, (1.) CF, as at firſt = 1.000000. (2.) C S, juſt now found 10.020627. (3.) The FCS 5° 15′ 4″, to find the ∠ FSC, the true Anomaly, and ;, the Eccentricity?

As the leſſer Side F C		10.000000
To the greater S C		10.020627
So Radius	---	10.000000
To *s.* of the Arch	46° 21′ 36″	10.020627
Sub.	45 00 00	
Remains	1 21 36	
F C A	37° 28′ 55″	
S C A	32 13 51	
F C S	5 15 4	
From	180 00 00	
Z ∠ ∠	174 44 56	
Half	87 22 28	

Now

New ſay,

As *s.* of	45° 00′ 00″	10.000000
To *s.* of rem. Arch	1 21 36	8.375477
So *s.* half Z opp. ∠ ∠	87 22 28	11.338599
To *s.* half their X	27 22 13	9.714076

Rem. ∠ FSC true Anom, 60 00 15 = 28. 0° 0′ 15″
Place of ♂ at the 3*d* Obſervation add 2 29 27 54

Aphelion of ♂ = — 4 29 28 09

	87°	22′	38
	27	22	28
Z	114	44	41
from	180	00	00
Rem.	65	15	19

= ∠ S F C

For *F S.*

As S. ∠ FSC	60° 00′ 15″	9.937549
To C F	90 00 00	10.000000
So S. ∠ FCS	5 15 4	8.961520
To F S	----	9.023971

Or thus:

	°	′	″	
As S. ∠ *S F C*	65	15	19 Co.	0.041828
To *S C*		---		10.020627
So S. ∠ *F C S*	5	15	4	8.961520
To *F S*		—		9.023975

6. For the Mean Anomaly in the third Obſervation, &c. the Angles *SAF, SBF. SCF,* are half the Elliptic Equations in the firſt, ſecond, and third Obſervations; which doubled, and added to the true Anomaly, equal to the Angles *E S A, ASB, ASC* in the firſt Semicircle of the Ellipſis. but ſubtracted in the ſecond Semicircle, the Sum or Difference is the Mean Anomaly.

Example

Example in the Work before us.

	S	°	′	″
From	12	00	00	00
True Anomaly = ∠ *FSC* ſub.	2	00	00	15
	9	29	59	45
The ∠ *FCS* 5° 15′ 4″ doub. is Equat. ſub.		10	30	04
Rem. the Mean Anom. in the 3*d* Obſervat.	9	19	29	41
Mid. Mot. of *Mars* from the 2*d* to the 3*d* Obſ.	1	17	02	21
Mean Anom. in the 2*d* Obſervation	8	02	27	20
Mean Mot. from the 1*ſt* to the 2*d* Obſervat.	1	28	48	51
Rem. Mean Anom. in the firſt Obſervation	6	03	38	29

7. For the Eccentricity.

As *CS*	10.020627	Co. Ar.	9 979373
To *FS* ---		----	9 023971
So Mean Diſtance	151955		5 181716
To Eccentricity	15313		4.185060

You muſt now make a Repetition of the above Work, by reaſon the Angle at *F* at the firſt ſtating is not perfectly true; but by going over of the Work again, I find the Place of the Aphelion in

		S.	°	′	″
the 1	Obſervation to be	5	0	56	08
the 2	Obſervation to be	5	0	58	49
the 3	Obſervation to be	5	1	1	18

And the Eccentricity 14169 and a half, ſuch Parts as the Mean Diſtance is 151955, and the Mean Anomalies and Elliptic Equations were as is here ſet down.

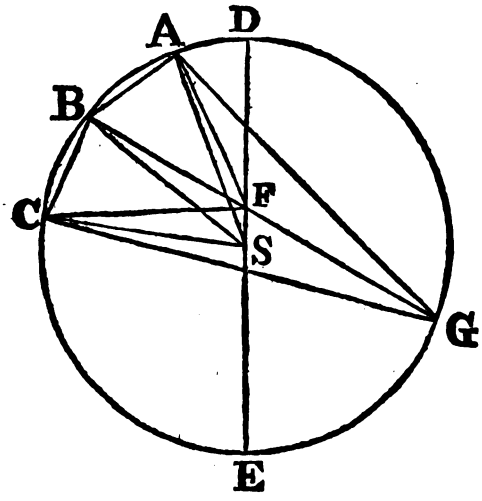
Mean

	Mean Anom. S. ° ′ ″		Equat. S. ′ ″		
1---6	2 28 10	A	0 31 9	add.	Double ∠ *S A F*
2---8	1 45 57	B	9 53 3	add.	*S B F*
3---9	18 45 48	C	9 40 48	add.	*S C F*

Example 2. By three Oppoſitions of the Sun and *Jupiter* I obſerved at *London*, the Anomalies, Aphelions, and Excentricity of *Jupiter* is requir'd?

		D.	h.	′	″		*Heliocent. Place ♃* S.	°	′	″
Anno 1721	*April*	9	10	35	25	A	7	0	41	34
1722	*May*	11	8	55	30	B	8	1	18	10
1723	*June*	14	3	49	13	C	9	3	21	24

With any convenient Radius ſweep the Diameter, and draw the Diameter D F S I which ſhall represent the Aphelial Line of *Jupiter* in the firſt, ſecond and third Obſervations, from which draw Lines to S the Sun, and alſo to F, the other Focus of *Jupiter*'s Ellipſis; continue F to G, and draw the other Line as in the *Scheme*, then by the Solution of the ſeveral Triangles, as has been ſhewn in *Mar.* and by repeating the Work, and correcting the Angle FAS FBS, FCS, I have at laſt found,



Mea

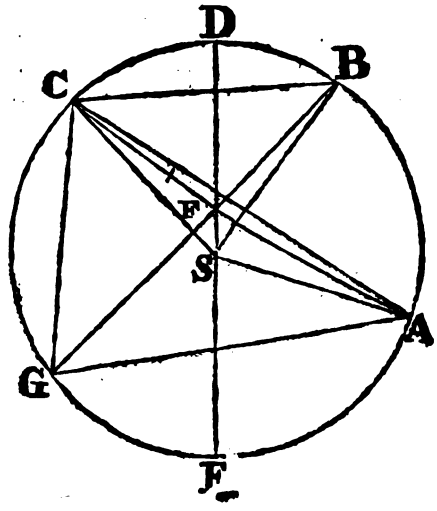
Mean Anom.	Aphelions.	Equations.	
S. ° ′ ″	S. ° ′ ″	° ′ ″	
0 22 43 31.	6 9 59 20.	A 2 1 17 ſub.	Eccentricity
1 25 42 7.	6 10 00 38.	B 4 24 35 ſub.	
2 28 49 57.	6 10 01 58.	C 5 30 31 ſub.	25074

ch Parts as the Mean Diſtance of ♄ à ☉ is 519995.

Example 3. By three Oppoſitions of the Sun and *Saturn* obſerv'd by me at *London*, I determin'd the Anomalies, Aphelions and Eccentricities, as follows.

	D. h. ′ ″	Heliocentr. Pl. ♄. S. ° ′ ″
Anno 1714, *Febr.*	15 11 25 14.	A 5 8 3 35
1720, *May*	1 5 28 0.	B 7 22 1 19
1727, *July*	24 9 33 0.	C 10 11 47 59

With any convenient Radius draw the Circle, and the Diameter DB, which ſhall repreſent the Aphelial Line of *Saturn*. A B and C the Places of *Saturn* in the firſt, ſecond and Obſervations; which Lines the Sun, and to F the other of the Ellipſis, ine BF to G, draw the other s, as in the Fi-; ſo ſhall SA, SC repreſent ranſverſe Dia-r of the Ellip-Then by the ion of the ſe- Triangles, and repeating the k, correcting Angles, &c. I at laſt found.



Mean

	Mean Anom. S. ° ′ ″			Aphelion S ° ′ ″			Equat. ° ′ ″		
1.	8	3	10 46.	A 8	28	52	9=6	0	40
2.	10	28	56 51.	B 8	29	00	26=4	4	2
3.	1	17	11 50.	C 8	29	10	6=4	33	57

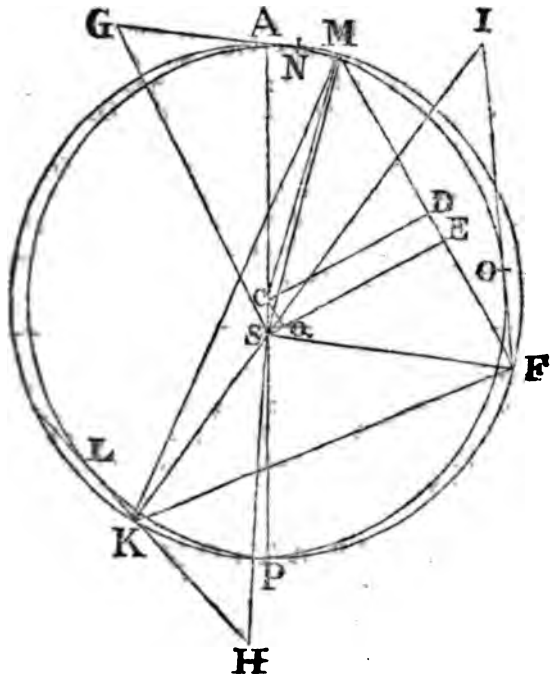
sub. Eccentricity 54376 in such Parts as the Mean Dist. of *Saturn* from the Sun is 953309.

CHAP. V.

By three Observations of the greatest Elongations of Venus from the Sun, to determine the Mean Anomalies, Aphelions and Eccentricities.

Example. AT *London* I observed the three greatest Elongations of ♀ from ☉, and the Earth's Place, with its Logarithm of its Distance from the Sun to be as follows.

	D.	h.	′		Pl. of Earth. S. °	′	″	Log. à ☉	Elong. °	′
1724 *June*	6	8	20.	I	8	26	37 54.	5.007256—45	2	3
1726 *Jan.*	13	6	30.	H	4	4	36 21.	4.993344—46	56	4
1727 *Aug.*	18	6	40.	G	11	5	45 33.	5.003836—46	8	3



In the inferiour Planets *Venus* and *Mercury*, when they are at their greateſt Elongations from the Sun, the Angle at the Sun's Center, contained between the Right Lines drawn to the Earth and Planet, is nearly the Complement of the Elongation: and in Orbits which are nearly Circular (as theſe are) a Line touching the Orbit is almoſt perpendicular to the Line drawn from the Sun to the Point of Contact.

Now in the Figure above, let ALPON be the Elliptic Orbit of *Venus*, AP the tranſverſe Diameter; to the Extremity of this Diameter draw the Circle AKPFM, whoſe Center is C; then to the three Places of the Earth at the times of Obſervation, draw Lines from the Sun, as SI, SH, and SG; from I, H and G, draw Lines, ſo that the Angles at I may be = 45° 21′ 35″, at H = to 46° 56′ 46″, and at G = to 46° 8′ 34″, which are the Elongations of *Venus* in the firſt, ſecond and third Obſervations; they will become Tangents to the Orb of the Planet, and touch it in its Heliocentric Places

Places at O, L and N: Then where the ſaid Tangent touches the Circle, draw Lines from thence to the Sun, as SF, SK, and SM; ſo will the Angles IFS, HKS, and GMS be Right Angles. Draw the Chords FM, MK, and KF, and let fall the Perpendiculars SE and CD: alſo from C let fall the Perpendicular CQ, and draw CM, and the Diagram is finiſh'd.

The Difference of the Earth's Longitude in the firſt and ſecond Obſervation is equal to the Angle H S I 142° 1′ 33″; between the firſt and third Obſervation it is the Angle G S I 69° 7′ 39″, and between the third and ſecond Obſervation it is the Angle HSG 148° 50′ 48″.

1, In the Right-angled plain Triangle ISF there are given, (1.) I S, the Logarithm of the Earth's Diſtance from the Sun 5.007136. (2.) The Angle at I 45° 21′ 35″, it being the Elongation of *Venus* from the Sun, at the time of the firſt Obſervation, to find S F?

OPERATION.

		o ′ ″	
As Radius		90 00 00	10.000000
To S I	—	—	5.007136
So S. Angle S I F		45 21 35	9.852194
To S F	—	—	4.859330

---

2. In the Right-angled plain Triangle H K S there are given, (1.) H S the Logarithm of the Diſtance of the Earth from the Sun in the ſecond Obſervation 4.993344. (2.) The Angle at H, it being the Elongation of *Venus* from the Sun 46° 56′ 46″, to find S K?

OPE-

OPERATION.

		° ′ ″	
As Radius		90 00 00	10.000000
To *S H*	=	—	4.993844
So S. ∠ *S H K*		46 56 46	9.863746
To *S K*	=	—	4.857090

3. In the Right-angled plain Triangle *G M S*, there are given, (1.) The Logarithm of the Diſtance of the Earth from the Sun in the third Obſervation = *S G* 5.003836. (2.) The Angle at G, it being the greateſt Elongation of *Venus* from the Sun 46° 8′ 54″, to find *S M*?

OPERATION.

		° ′ ″	
As Radius		90 00 00	10.000000
To *S G*	=	—	5.003836
So S. ∠ *S G K*		46 08 54	9.858017
To *S M*	=	=	4.161853

4. In the Triangle *S F M* are given, (1.) The Logarithm of *S M* found in the third hereof. (2.) The Logarithm of *S F* found in the firſt hereof. (3.) The ∠ *F S M* 69° 54′ 58″, as will be ſhewn below, to find the Angles at *F* and *M*, and the Side *F M*?

OPERATION.

As the leſſer Side *S F*		4.859330
To the greater *S M*		4.861853
So Radius	90° 00′ 00″	10.000000
To *s.* of	45 09 59	10.002523
Sub.	45 00 00	
Remains	00 09 59	

Now, to find the Angle F S M, obſerve the following Steps.

OPERATION.

	°	′	″	
HSG	148	50	48	
GSM	43	51	6	Compl. of ♀ Elong. at 3*d* Obſerv.
HSM	192	41	54	
From	360	00	00	
HSM	167	18	06	
HSI	142	01	33	
MSI	25	16	33	
FSI	44	38	25	Compl. of ☿ Elong. at 1*ſt* Obſerv.
FSM	69	54	58	
From	180	00	00	
Z ∠ ∠ at M & F	110	05	02	
Half	55	02	31	

Now ſay,

	°	′	″	
As Radius, or *t.* of	45	0	0	10.000000
To *t.* of the remaining Arch	0	9	59	7.462964
So *t.* half Z ∠ ∠	55	2	31	10.155450
To *t.* half their X	0	14	17	7.618414
Z is the ∠ *SFM*	55	16	48	
X is the ∠ *SMF*	54	48	14	

For F M.

As S. ∠ *SFM*	55° 16′ 48	Co. Ar.	0.085157
To *S M*	----		4.861853
So S. ∠ *FSM*	69 54 58		9.972753
To *F M*	83131		4.919763

5. In

5. In the Triangle SKM are given, (1.) The Logarithm of SK, as found in the ſecond hereof. (2.) The Logarithm of SM, as found in the third. (3.) The Angle KSM 149° 38′ 40″, to find the Angles, and the Side KM?

OPERATION.

As the leſſer Side KS		4.857090
To the greater SM		4.861853
So Radius	90° 00′ 00″	10.000000
To *t.* of	45 18 50	10.004763
Sub.	45 00 00	
Remains	00 18 50	

	° ′ ″
HSM	192 41 54
HSK	43 3 14
KSM	149 38 40
From	180 00 00
$Z \angle L =$	30 21 20
Half =	15 10 40

	° ′ ″	
As Radius, or *t.* of	45 00 00	10.000000
To *t.* of remaining Arch	00 18 50	7.738570
So *t.* half $Z \angle L$	15 10 40	9.433413
To *t.* half X	00 05 06	7.171983
Z is the $\angle SKM$	15 15 56	
X is the $\angle SMK$	15 05 34	

For KM.

As S. $\angle SKM$	15° 15′ 56″ Co. Ar.	0.579561
To SM		4.861853
So S. $\angle KM$	30 21 20	9.703604
To KM	139642	5.145018

6. In the Triangle FSK, are given, (1.) S F. as found in the firſt. (2.) The Logarithm of S K, as found in the ſecond. (3.) The Angle KSF 40° 26′ 22″, as will be ſhewn below; to find the Angles at F and K, and the ſide KF?

OPERATION.

As the leſſer ſide S K		4.857090
To the Greater S F		4.859330
So Radius	90° 00′ 00″	10.000000
To *t.* of the Arch	45 08 52	10.002240
Sub.	45 00 00	
Remains	00 08 52	

HSI	142°	01′	33″
HSI +	43	03	14
KSI	185	04	47
ISF —	44	38	25
KSF	140	26	22
From	180	00	00
Z ∠ L	39	33	38
Half	19	46	49

As Radius or *t.*	40	00	00	10.000000
To *t.* of remaining Arch	00	08	52	7.411150
So *t.* half Z ∠ L	19	06	49	9.555859
To *t.* half X	00	03	13	6.967009
Z ∠ *SKF*	19	50	02	
X ∠ *SFK*	19	48	36	

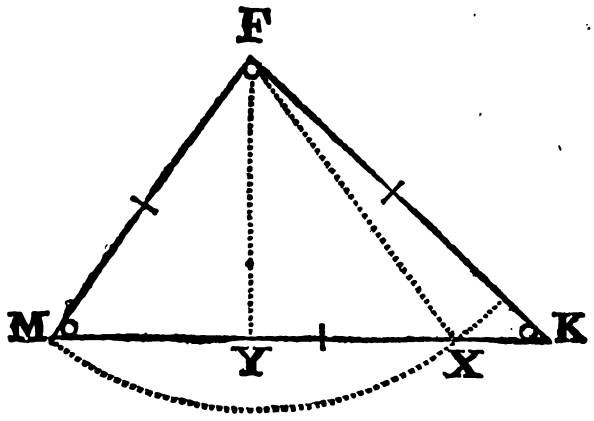
For K F.

As S. ∠ *SFK*	19°	43′	36 Co. Ar.	0.471683
To *SK*	—		—	4.857090
So S. ∠ *KSF*	39	33	38	9.804067
To *KF*	135781			5.132840

7. In

7. In the Triangle FMK, are given, (1.) The Side F M 83131. (2.) The Side K M 139642. (3.) The Side K F 135781, that is, all the Sides, to find the Angles; and falls under the third Axiom of Oblique-angled plain Triangles.

I ſhall here ſhew three ſeveral Ways of ſolving this Triangle; and firſt by the common Method. And that the Reader may have a better Idea of the Performance, I ſhall take the Triangle FMK out of the fundamental Diagram, and lay it down, as in the Margin, to prevent a Confuſion of Lines.



OPERATION.

FK	135781
MF	83131
Z	218912
X	52650

Now ſay,

As MK the longeſt Side	139642	Co. Ar. 4.854981
To Z of the other 2 Sides	218912	5.340270
So is their X	52650	4.721398
To x K the alternate Baſe	82537	4.916650
From MK	139642	
Remains M x	57105	
Half = M y = y x	28552.5	
+ x K	82527	
Z = y K	111089.5	

As M F	83131	4.919758
To Radius	90° 00′ 00″	10.000000
So M y	28552.5	4.455644
To C S. ∠ at M	69 54 34	9.535886
SMF	54° 48′ 14″	
SMK	15 05 34	
SMF	69 53 48	

As FK	135781	5.132840
To Radius	90° 00′ 00″	10.000000
So y K	111189.5	5.045673
To C S. ∠ at K	35 06 00	9.912833
FMK	69° 54′ 34″	
FKM	35 06 09	
Z	105 00 34	
From	180 00 00	
MFK	74 59 26	

2. The ſecond Operation may be wrought more expeditiouſly thus, *viz.* Take the Difference between the half Sum and each Side ſeverally, and note the Differences with the Figures 1, 2, 3. Then take the Logarithm of the half Sum, and firſt Difference, and add them together; alſo add the Logarithms of the ſecond and third Differences together; ſub-

ſubtract the Sum of the firſt two Logarithms from the Sum of the laſt two, and take half this remaining Logarithm, adding Radius, and it ſhall be the Tangent of half the Angle ſought.

See the Work.

MK	139642
FK	135781
MF	83131
Z	358554
Half	179277

MK	139642	FK	135781	MF	83131
Half Z	179277	Half Z	179277	Half Z	179277
Diff. 1.	39635	X. 2.	43496	X. 3.	96146

Half Z	179277	5.253524	X. 2. 43496.	4.638449
X. 1.	39635	4.598079	X. 3. 96146.	4.982931
	Z	9.851603	Z	9.621380
	Z	9.621380		

Rem. 19.769777
Half = 9.8848885 *t.* of 37° 29′ 34″
Doub. is = ∠ MFK 74 59 08

A third Method to find an Angle, by having the three ſides given.

Rule. From half the Sum of the three ſides, ſubtract the ſide oppoſite to the Angle requir'd, and note the Remainder; then to the Co. Ar. of the two ſides, including the required Angle, add the Logarithm of half the Sum of the ſides, and the Logarithm of the Remainder; half the Sum of theſe four Logarithms will be the Co. Sine of half the requiſed Angle.

Operation *for the Angle* F *in the laſt Figure.*

FK	135781	} Add.
MF	83131	
MK	139642	
Z	358554	
Half	179277	
MK —	139642	
Rem.	39635	

FK	135781	Co. Ar.	4.867161
MF	83131	Co. Ar.	5.080237
Half Z	179277		5.253447
X	39635		4.598079
Sum Logarithms			19.798924
Half is C S. of	37° 30′ 3″		9.899462
Double = ∠ F	75 00 6		9.899467

8. In the Right-angled Triangle *SEF* are given, (1.) The ſide *S F*, as found in the firſt. (2.) The Angle *S F E* 55° 16′ 48″, as found in the fourth; to find *SE* and *FE*?

As Radius	90° 00′ 00″	10.000000
To S F		4.859330
So S. ∠ SFE	55 16 48	9.914843
To S E	59453	4.774173
As Radius	90 00 00	10.000000
To S F		4.859330
So S. ∠ FSE	34 43 12	9.755544
To F E	41197	4.614874

M F	83131
Half = D F	41565.5
E F ſub.	41197
Rem. DE=CQ	368

9. In the Triangle CDM, are given (1.) The Side DM, it being half of M*f* 41565.5. (2.) The Angle MCD, it being equal to the Angle *f*K M 35° 9′ 30″, and conſequently the Angle *CMD* is 54° 50′ 30″; becauſe the Angle at D is right; to find *CM* and *CD*?

	° ′ ″	
As S. ∠ *DCM*	35 09 30	9.760300
To *D M*	41565.5	4.618733
So Radius	90 00 00	10.000000
To *CM*	72182	4.858433

the Semidiameter of the Orb, equal to the mean Diſtance of ♀ *à* ☉.

As Radius	90 00 00	10.000000
To *C M*	——	4.858433
So S. ∠ *CM D*	54 50 30	9.912521
To *C D* ſub.	59014	4.770954
☿ *E* ——	59453	
Rem. S Q	439	

10. In the Right-angled plain Triangle SCQ are given, (1.) S Q 368. (2) S Q 439, to find S C, the Eccentricity and Aphelion?

As S Q	439	2.642465
To Radius	90° 00′ 0″	10.000000
So S Q	368	2.567026
To *t.* ∠ CSQ=ASE	40 02 55.	9.924561
∠ FS E +	34 43 12	
Z ∠ ASF	74 46 07	
Sub. ∠ ISF	44 38 25	
Rem. ∠ ASI	30 07 42	
Earth's Place at I	8 26 37 54	
Aphelion A	9 26 45 36	

	° ′ ″
	90 00 00
C S Q	40 02 55
S C Q	49 57 05

As S. ∠ SCQ	49° 57′ 5″	9.883945
To SQ	439	2.642465
So Radius	90 00 0	10.000000
To S C Eccentricity	573.5	2.758520

Hence the Semidiameter of the Orb equal to the mean Diſtance of ♀ à ☉ is *cm*, = *c* A 72182, the Eccentricity 573 and half, and the Longitude of the Aphelion 9ˢ. 26° 45′ 36″.

But raducing the curtate Diſtance to the true, and comparing theſe Obſervations with Mr. *Flamſteed's*, I find the mean Diſtance of ♀ à ☉ 72337, the Eccentricity 505, the Place of the Aphelion in the Firſt Obſervation 10ˢ. 6° 54′ 29″, in the ſecond, 10ˢ. 6° 56′ 0′, and in the third, 10ˢ. 6° 57′ 30″; the mean Anomaly in the Firſt Obſervation, 9ˢ. 4° 57′ 20″, in the ſecond, 4ˢ. 13° 40′ 43″, and in the third, 11ˢ. 16° 7′ 36″; the Elliptic Equation in the Firſt Obſervation, 47′ 47″ add; in the ſecond, 34′ 56″ ſubtract, and in the third, 11′ 25″ add.

CHAP.

CHAP. VI.

BY three Obſervations of the greateſt Elongations of *Mercury* from the Sun, I have found as follows.

	D.	h.	′		Place ☉. S.	°	′	″	*Log.* à ⊙	Elongat. °	′	″
1724 *Sept.*	18	6	20	I	00	06	43	22	5.000059	25	30	49
1725 *Febr.*	21	5	27	H	5	14	09	05	4.996895	27	23	14
1726 *Aug.*	13	6	57	G	11	01	10	15	5.004322	27	09	54

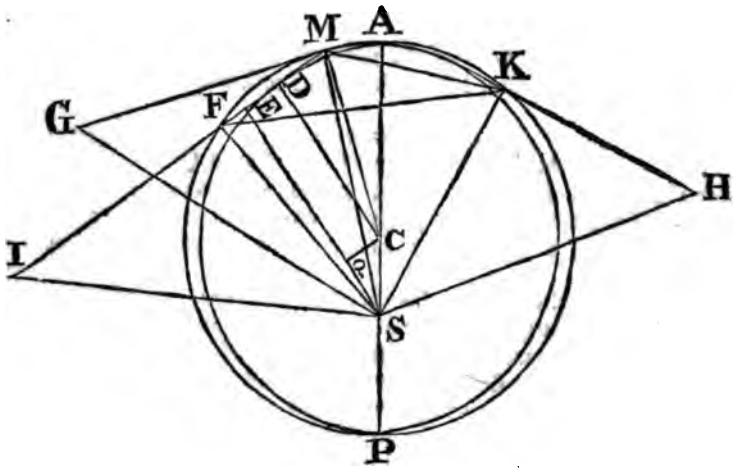
By drawing the Figure (as directed in *Venus*) and ſolving the ſeveral Triangles, I have at laſt found, the Semidiameter of the Orb equal to the mean Diſtance of *Mercury* from the Sun 38262, the Eccentricity 7964, and the Longitude of the Aphelion 8ſ. 13° 05′ 04″ in the firſt Obſervation.

8 13 05 25 in the ſecond, and
8 13 06 43 in the third.

The Mean Anomaly	1ſ.	23°	04′	56″	in the firſt Obſervat.
	11	01	20	08	in the ſecond, and
	0	13	16	06	in the third.
The Elliptic Equation		16	07	00	in the firſt Obſ. ſub.
		9	11	59	in the ſecond, add.
		4	19	15	in the third. ſub.

See the Scheme, and mark it well.

That



That the Obſervations of Eclipſes are the only means to get to a Truth of the times when they happen, is manifeſt, from the great pains I have taken, and the Care I have had both in the Obſervations and Calculations: For not one has eſcap'd my View theſe thirty four Years laſt paſt, that have been viſible in our Hemiſphere.

And for the ſatisfaction of the inquiſitive Reader, I will here inſert the Obſervation of the Lunar Eclipſe that happen'd the 22*d* of *January*, 1730, in the Morning, at *Bedford*-Coffee-houſe in *Covent-Garden*, *London*, in Company with ſeveral Reputable Gentlemen, and with exquiſite Inſtruments, *viz.* we had two Reflecting Teleſcopes, one of two, and the other of nine Feet long; a fine Quadrant, a Micrometer, and all other things for my purpoſe.

The

The apparent times of the Eclipſes were thus obſerv'd:

	D.	h.	′	″	
Beginning, *Jan.*	22	14	50	00	P.M.
Middle		15	47	00	
End		16	43	8	
Digits		03	15	0	

Time by my Syſtem.

Beginning, *Jan.*	22	14	56	54	Clocks too faſt 14′ 24″.
Middle		16	00	02	
End		17	03	10	
Digits		03	32	51	

But by another Calculation of mine, from new Tables, founded upon Sir *Iſaac Newton*'s Theory of the Moon, it is thus:

Beginning, *Jan.*	22	14	56	45
Middle		15	53	19
End		16	49	53
Digits		03	08	18

Scientia Stellarum,

Beginning, *Jan.*	22	14	37	34
Middle		15	33	48
End		16	30	02
Digits		02	53	00

Weaver's Almanack.

Beginning, *Jan.*	22	14	40	52
Middle		15	41	48
End		16	42	44
Digits		03	16	48

Ladies Diary.

Beginning, *Jan.*	22	15	13	
Middle		16	06	
End		17	00	
Digits		02	39	

Tycho Wing, in *Coley*'s Almanack, which, he ſays, is from Sir *Iſaac Newton*'s Theory of the Moon; but that is a miſtake, becauſe it is ſo vaſtly wide from Truth, that it will not bear the teſt.

He gives the ſame thus:

		°	′	″	
Beginning, *Jan.*	22	14	31	23	P. M.
Middle		15	29	40	
End		16	27	57	
Digits		03	06	00	

Here we ſee ſuch a Diſagreement in the time of this Eclipſe, given by ſeveral Authors above, that it is hard to be reconcil'd.

One tells us, his Numbers are from bright Tables, never yet made publick.

Another tells us, that his Calculations are from Sir *Iſaac Newton*'s Theory of the Moon; and therefore no body muſt queſtion the truth of them. Indeed, if it were ſo, not any one living would dare to queſtion them. But I deny the Aſſertion; and can prove, that his Calculation is not from Sir *Iſaac Newton*'s Theory.

CHAP.

CHAP. VII.

To determine the greateſt Elongation of Mercury *and* Venus *from the* Sun.

THE Quantity of this Angle, that theſe two inferiour Planets make at the Earth, is what was never yet (that I know of) truly determin'd, but always given in groſs. All the Writers of Aſtronomy, both ancient and modern, only tell us, that *Mercury* is never more than 28 or 29°, and *Venus* never more than 48° from the Sun.

I ſhall therefore in this place ſhew the true Quantity of their Elongations, both the greateſt and leaſt that ever can happen.

I have in the foregoing Chapter determined the Eccentricity of *Mercury* to be 7964 of the ſame Parts, of which the mean Diſtance is 100000. Now, becauſe theſe Numbers are too large to be laid down by any Scale, I ſhall reduce them to ſuch as may be laid down, thus:

Suppoſe the mean Diſtance of the Earth from the Sun to be 1000, the Aphelial Diſtance will be found in that Proportion thus:

As 101692 : 1000 : : 1692 : 16.6
Eccentricity 16.6

Radius 983.4 of the Earth's Orb.

2. For *Mercury*'s Aphelial Diſtance reduced, ſay,

As 101692 : 1000 : : 46680 : 459.

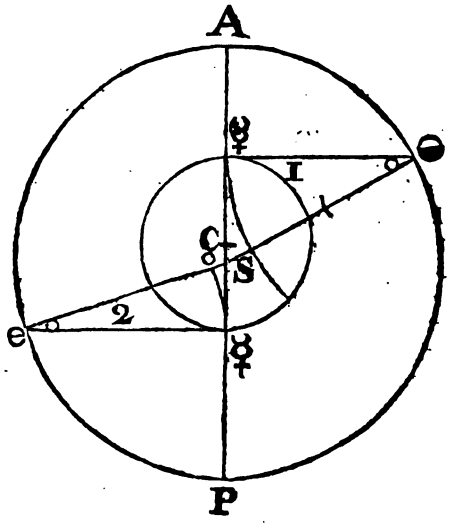
3. For the Eccentricity of this reduced Orb, ſay,

As 46680 : 7964 : : 459 : 78.
78

Rem. Radius of ☿'s Orb 381.

Make

Make A o equal to 983.4 on the Line of Lines on the Sector, and ſweep the Circle A ☌ P, for the Earth's Orb.



Draw PSA for the Aphelial Line of *Mercury*; take 1000 from the Sector, as it now ſtands, and ſet it from A to S; take the Aphelial Diſtance of ☿ 549 from the ſame Lines on the Sector, and ſet it from S to ☿, towards A; take 381 from the ſame Sector, and ſet it from ☿ to C, ſo is C, the Center of *Mercury*'s Orb.

Draw ☌ ☿ a Tangent to the Orb, to cut the Aphelial Line at Right Angles in ☿; and draw S ☌; ſo is the Angle ☿ ☌ S the greateſt Elongation that *Mercury* can ever have; becauſe the Aphelial Line of ☿, (which is the longeſt ſide of the Triangle) ſubtends the Angle at the Earth.

To the Perihelion of *Mercury* draw the Tangent ☌ ☿, to cut the Perihelial Line at Right Angles in ☿; ſo is the Angle ☿ ☌ S in the ſecond Triangle the leaſt Elongation that *Mercury* can have, whoſe Quantities are thus found.

For the greateſt Elongation.

In the Firſt Triangle there are known (ſuppoſing the Earth in Perihelion) the Logarithm of the Perihelial Diſtance of the Earth from the Sun = 4.992589. (2.) The Logarithm of *Mercury*'s Aphelial Diſtance = S ☿ 4.669131, to find the Angle ☿ ☌ S?

OPE-

OPERATION.

As S ☉ Perihelion Diſtance	—	4.992589
To Radius	—	10.000000
So S ☿ Aphelion	—	4.669131
To S. ∠ ☿ ☉ S. Elongat.	28° 21′ 8″	9.676542

2. For the leaſt in the Second Triangle.

As S. Earth's Aphelion	—	5.007286
To Radius	—	10.000000
So S ☿ Perihelion	—	4.487704
To S. ∠ S ☉ ☿ Elongat.	17° 35′ 42″	9.480418

Secondly, To determine the greateſt and leaſt Elongation of *Venus* from the *Sun*.

When *Venus* and *Mercury* are at their greateſt Elongation from the Sun, they move with equal pace with our Earth for a ſmall time; and then a Line drawn from them ſeverally to the Earth will be a Tangent to their Orbits reſpectively; ſo that looking into an Ephemeris that has their Motions to Minutes, you may diſcover the Day of their greateſt Elongation from the Sun, by obſerving their equal pace with him. And by reaſon of the different Poſitions of our Earth at different times when theſe two Inferiours are at their greateſt Elongation, this Quantity will be always different; but is greateſt when the Planet is in Aphelion, and leaſt when in Perihelion; becauſe the Diſtance of the Planet from the Sun is the Side of the Triangle that ſubtends the Angle of Elongation, as is plain from the Demonſtrations hereunto annexed.

In the foregoing Chapter I have found the Eccentricity of *Venus* to be 505, and her Aphelial Diſtance to be 72838 of ſuch Parts as the mean Diſtance of Sun from Earth is 100000.

Now, to reduce theſe Numbers practicable on the Sector, I proceed as in *Mercury*.

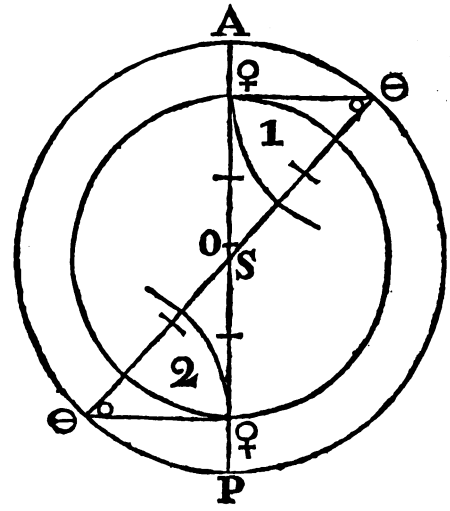
As 101692: 1000 : : 72838 : 716, by which *Venus*'s Aphelial Diſtance is reduced to 716.

Now, for the Eccentricity of this reduced Orb, ſay,

As 72838 : 505 : : 716 : 5.
Eccentricity ſub. 5

Rem. the Radius 711 of *Venus*'s Orb reduced.

Make AO equal to 983.4 (as in ♀) on the Line of Lines on the Sector, and draw the *Circle* A ☉ P for the Earth's Orb; draw ASP for the Aphelial Line of *Venus*; take 1000 from the Sector as it now ſtands, and ſet it from A to S; take the Aphelial Diſtance of *Venus* 716 from the Line of Lines, & ſet it from S to ♀ towards A; then take the Radius of the Orb of ♀ 711. and ſet one Foot of the Compaſſes in ♀, the other will reach almoſt to S, the Center of the Orb, on which Center ſweep *Venus*'s Orb; draw ♀ ☉ a Tangent to the Orb, and compleat the Triangles, by joyning ☉ and S; then is the Angle ♀ ☉ S the greateſt Elongation, and is thus found in the firſt Triangle:



As S *Earth*'s Perihelion	♒	4.992589
To Radius	♒	10.000000
So S. *Venus*'s Aphelion	----	4.862359
To S. ∠ ♀ ☉ S Elongat.	47° 38′ 35″	9.869770

Secondly, By compleating the ſecond Triangle S ♀ ☉, I proceed to find the leaſt Elongation that *Venus* can have, thus:

As

As S *Earth*'s Aphelion	—	5.007286
To Radius —	—	10.000000
So S *Venus*'s Perihelion	— —	4.856295
To S. ∠ S ⊕ ♀ Elongat.	44° 56′ 14″	9.849009

So that *Venus*'s Elongation is never more than 47° 48′ 35″, nor leſs than 44° 56′ 14″, in what part of its Orbit ſoever the Earth be.

I ſhall here ſet down the Days when *Mercury* is at his greateſt Elongation this Year 1734, with the Sign he is in, and the Quantity of the Angle at the Earth.

		°	′
1734.	*Jan.* 8. *Mercury* in *Capricorn* Osient.	24	36
	Mar. 22. *Mercury* in *Taurus* Occident.	19	2
	May 8. *Mercury* in *Taurus* Orient.	25	4
	July 19. *Mercury* in *Virgo* Occident.	27	17
	Sept. 1. *Mercury* in *Virgo* Orient.	17	44
	Nov. 12. *Mercury* in *Sagittary* Occid.	21	28
	Dec. 23. *Mercury* in *Sagittary* Orient.	23	5

And the ſame Year 1734, *Venus*'s Elongat. Max. à ⊙ falls thus:

		°	′
Jan. 10.	*Venus* in *Piſces* Occid.	46	59
Mar. 4.	℞ in 22° ♈		
June 2.	*Venus* in *Taurus* Orient.	45	53

Here follow the Calculations of *Venus*'s Place in *Jan.* 1734, at the time when ſhe is at her greateſt Elongation from the Sun.

By my Planetary Inſtruments you may lay down the Triangles at the times above-mentioned, which will greatly inform you of the true Theory of them: And becauſe Time (the common Devourer of all things) will render thoſe Inſtruments to err in *Saturn* 1° in 45 Years, in *Jupiter* 1° in 50 Years, in *Mars* 1° in 51 Years and half, in *Venus* 1° in 63 Years, and in *Mercury* 1° in 70 Years: Therefore, for the ſake of the Inquiſitive, I will here ſubjoyn a Table, by which new Inſtruments of all the Planets may be projected at pleaſure, making the Aphelial Diſtance 1000.

The Aphelions of the Planets, according to my Tables.

Saturn	♐	29	18	40	The laſt Day of the *Julian* Year at Noon 1733.
Jupiter	♎	10	54	35	
Mars	♍	1	12	59	
Earth	♑	8	19	11	
Venus	♒	7	3	30	
Mercury	♐	13	13	14	

Saturn 946 } Radius { *Saturn*'s Orb à Aph. Point to its Center.
Earth 100.84 } dius { *Earth*'s Orb Center à ☉ is 1.67.

Jupiter 954 } Radius { *Jupiter*'s Orb à Aphel. Point to its Center.
Earth 186 } dius { *Earth*'s Orb Center from ☉ is 3.

Mars 915 } Radius { *Mars*'s Orb à Aphel. Point to its Center.
Earth 611 } dius { *Earth*'s Orb Center à ☉ is 11.

Earth 983.4 } Radius { *Earth*'s Orb à Aphel. Point to its Center
Venus 716 } dius { *Venus*'s Orb Center à ☉ is 5.

Earth 983.4 } Radius { *Earth*'s Orb à Aph. Point to its Center.
Mercury 459 } dius { *Mercury*'s Orb Center à ☉ is 78.

Or in *Venus* 716—5=711, the Radius of her Orb; and in *Mercury* 459—78=381, the Radius of his Orb.

Then to delineate the Inſtrument of *Saturn*, on the Center ☉ ſweep a Circle, and divide it into 12 Signs, as *per* Figure.

From ☉ draw a Line to the Place of this Aphelion ♐ 29° 19′, which ſhall repreſent the Aphelial Line of *Saturn*.

Thro'

Thro' ☉ draw a Line from the Place of the Earth's Aphelian ♈ 8° 19′, and it ſhall repreſent the Aphelial Line of the Earth.

Take the Radius of the Zodiac, and open the Sector to 10 on the Line of Lines; as the Sector now ſtands, take off 946 in your Compaſſes, and ſet it on *Saturn*'s Aphelial Line from A towards ♑, and draw the Orb of *Saturn*.

Then take 100.84 (nearly 101) and ſet it from ☉ on the Aphelial Line of ♑ to B: Take 1,67 from the ſame Line of the Sector, and ſet it from ☉ towards B, and it ſhall give the Center of the Earth's Orb as before; which Circle draw as is done in the Scheme, and that ſhall be the Earth's Orb truly proportion'd to the Orb of *Saturn* in his Theory.

The next thing to be done, is to draw the Ecliptic, which muſt be done from this Table of the Places of their Nodes.

		°	′	
Saturn	♑	21	15	The laſt Day at Noon of the *Julian* Year 1733.
Jupiter	♑	8	2	
Mars	♉	17	46	
Venus	♊	14	15	
Mercury	♉	15	16	

Thro' the Center of ☉ and ♑ 21° 15′ in the Zodiac draw the Line ♋ ♑; with the Radius of the Orb find the Center of a Circle to cut the Orb in ♋ and ♑, and to make an Angle of the greateſt Inclination 2° 30′; and ſo is the Scheme or Inſtrument compleated.

A Table *of the Planets Inclinations.*

	°	′	″
Saturn	2	30	10
Jupiter	1	19	10
Mars	1	51	00
Earth	23	29	00
Venus	3	23	20
Mercury	6	59	20
Moon	5	17	20

CHAP. VIII.

1. *Of the Mean Motion of the Earth, her Aphelion, and the Receſſion of the* Equinox, *&c.*

THE laſt Day of *December* at Noon, under the Meridian of *London* 1700, Old Stile, the mean Place of the Earth was 3ˢ. 20° 43′ 50″, the Place of the Aphelion was 9ˢ. 7° 44′ 30″, and the Place of the firſt Star of *Aries* was 29° 0′ 10″. To which I ſhall prefix the middle Motions for Years compleat, as below.

Radix

		Long. Earth. S. ° ′ ″	Aphel. Earth S. ° ′ ″	Receſſion. S ° ′ ″
Radix *Anno*	1701	3 20 43 50	9 7 44 30	0 29 0 10
Year Compleat	1000	0 7 33 20	0 17 30 0	0 13 53 20
	100	0 0 45 20	0 1 45 0	0 1 23 20
	60	0 0 27 12	0 1 3 0	0 0 50 0
	40	0 0 18 8	0 0 42 0	0 0 33 20
	20	0 0 9 4	0 0 21 0	0 0 16 40
	4	0 0 1 49	0 0 4 12	0 0 3 20
	3	11 29 17 0	0 0 3 9	0 0 2 30
	2	11 29 31 20	0 0 2 6	0 0 1 40
	1	11 29 45 40	0 0 1 3	0 0 0 50
Days Compleat	30	0 29 34 10	0 0 0 5	4
	24	0 23 39 20	0 0 0 4	3
	2	0 1 58 17		
	1	0 0 59 8		
Hours Compl.	2	0 0 4 56		
	1	0 0 2 28		

The Sun's Apparent Semidiameter at the Earth's Mean Diſtance from it is 16′ 5″, and the Horizontal Parallax of the Sun, for the Smallneſs of the Eccentricity of the Earth's Orb, and the Smallneſs of its own Quantity, may be always ſtated 10″.

2. *To Calculate the Mean Place of the* Earth, *and her Aphelion, and thence the Mean Anomaly, to any given Time.*

1. If the given Time be after the Year 1701, take the Mean Place for 1701 Current, from the foregoing Table, which I call the *Radix*.

2. To the Radical Place, add the Mean Motions for the Years, Months, Days, Hours, Minutes and Seconds Compleat, this Sum is the Mean Motion, or Place ſought.

N. B. The true Length of the Solar Year being 365 D. 5 h. 49′ 2″ 15‴, the Mean Motion of the Earth to any Months and Days may be known by ſaying, If the Length of the Solar Year give 360°, What will the Days from the firſt of *January*, to the Day propoſed, give? (For this purpoſe, ſee the

the Table in my *Satellite Aſtronomy*, Page 94.) And for the Mean Motion of the Aphelion, to any Day in the Year, ſay, As the Length of the Solar Year 365 D. 6 h. 49′ 2″ 15‴, To 63″, So are the Days from the firſt of *January*, to the Day propoſed, To the Motion of the Earth's Aphelion: Minding in Leap-Year to add the Motion of a Day more.

Laſtly, Subtract the Mean Place of the Aphelion, from the Mean Longitude of the Earth, and there will remain the Mean Anomaly.

Note, If the Time be before 1701, ſubtract the Mean Motion from the Time propoſed, to 1701, from the Radical Place; then work as before is taught.

Example. Let it be required to find the mean and true Place of the Earth, her Aphelion and Mean Anomaly for *April* 29, at Noon, in the Year 1726?

Firſt, The Days from the firſt of *January*, to *April* 29, inclusive, are 119 Days. Then,

	D.	h.	′	″	‴	∘		D.	S.	∘	′	″	
As	365	5	49	2	15	: 360	::	119	: 3	27	17	32	Long.
And As	365		49	2	15	: 63	::	119	: 20′				

Now ſee the Work.

		Longit. *Earth*. S.	∘	′	″	Aphel. *Earth*. S.	∘	′	
Radix	1701	3	20	43	50	9	7	44	30
Years	200	0	0	9	4	0	0	21	00
	4	0	0	1	49			4	12
	1	11	29	45	40			1	03
April 29		3	27	17	32				20
Mean Place *Earth*		7	17	57	55	9	8	11	05
Aphelion ſub.		9	8	11	5				
Mean Anomaly		10	9	46	50				

3. Given the Earth's Mean Anomaly, to find the Angle at the upper *Focus* of the Earth's Ellipſis.

To

To the Conſtant Logarithm 89.3909656, add the Sine of twice the Mean Anomaly; the Sum will be the Logarithm of the Decimal Parts of a Minute; which being ſubtracted from the Mean Anomaly in the firſt and fourth Quadrants of the Orb, but added in the ſecond and third, gives the Angle at the upper *Focus*.

Example. Let it be required to find the Angle at the upper *Focus* in the foregoing Caſe, where the Mean Anomaly is 10S. 9° 46′ 50″?

OPERATION.

	S.	°	′	″		
Mean Anom. *Earth*	10	9	46	50		
Double	8	19	33	40		
Complement		79	33	40	Sine	9.9927517
Conſtant Logarithm			----			89.3909656
The Logarithm of		2419				99.3837173
			60			
Seconds		14,5140			ſubt.	
Mean Anomaly	10	9	46	50		
Angle at upper *Focus*	10	9	46	35		

4. Given the Angle at the upper *Focus*, to find the true Anomaly, and ſo the Earth's Place in her Orbit, and conſequently the Sun's Place in the Ecliptic.

To the Conſtant Logarithm 9.9852994, add the Tangent of half the Angle at the upper *Focus*, and you will have the Tangent of half the true Anomaly.

And here obſerve, that if the half of the Angle at the upper *Focus* be more than a Quadrant, then take the fourth proportional Tangent from 180°, and the double of the Remainder is the true Anomaly.

Then to the true Anomaly add the Place of the *Aphelion*, and you have the Earth's true Place in her Orbit; to which add Six Signs, and you will have the Sun's true Place in the Ecliptic.

Ex.

Example. Let the Sun's Place be required to the time above, when the Angle at the upper *Focus* was 10S. 46′ 35″?

OPERATION.

	S.	°	′	″					
Angle at the upper Focus	10	9	46	35	Compl.	50	13	25	
Half	5	4	53	17.5					
Complement	0	25	6	42.5	t.	9.6708815			
Conſtant Logarithm						9.9852934			
Sum, is the Tangent of		24	22	27		9.6561749			
From		180	0	0					
Rem. half true Anom.		155	37	33					
True Anomaly		311	15	6	=	10	11	15	6
Aphelion add						9	8	11	5
Earth's true place						7	19	26	11
Add						6	2	0	0
Sun's true place						1	19	26	11

5. To find the Elliptic Equation

The Difference between the Mean Anomaly and the True, is the Elliptic Equation, which is to be ſubtracted from the Mean Longitude in the Six firſt Signs of Mean Anomaly, and added in the other Six; the Sum or Difference is the true Place of the Earth: So in the preceding.

	S.	°	′	″
Example, the Mean Anomaly is	10	9	46	50
The true Anomaly is	10	11	15	6
Elliptic Equation add,		1	28	16

After this manner is the Sun's Equation in the Table of my *Compleat Syſtem*, Pages 28, 29, Calculated.

Mean

	S	°	′	″
Mean Longitude of the Earth	7	17	57	55
Ecliptic Equation add		1	28	16
Earth's true Place as before	7	19	26	11

6. Given, the Angle at the upper *Focus*, and the true Anomaly, to find the Logarithm of the Diſtance of the Earth from the Sun; ſuppoſing the Logarithm of the mean Diſtance to be 10.0000000. = AC = CP = ☉G in the Scheme, Page 15.

Rule. Take the Sum and Difference between the true Anomaly and the Angle at the upper *Foues*, and alſo the half of the Sum and Difference; then to the Sine of the Angle at the upper *Focus* add the Exceſs of the Co-Secant above the Radius of the half Sum found above, and the Secant above the Radius of the half Difference; the Sum of theſe three will be the Logarithm of the Diſtance of the Earth from the Sun ſought.

But to have it agree to the Mean Diſtance of 100000. as in my Solar Tables in my *Syſtem*, take half of the Characteriſtick, and 'tis done. Let the Example be as above.

	S	°	′	″		
True Anomaly	10	11	15	6		
Angle at upper Focus	10	9	46	36	Sine	9.885650
Sum	8	21	1	41		
Half	4	10	30	50½	Co-Sec.	0.119061
Difference		1	28	31		
Half		0	44	15½	Sec.	0.000036
The Logarithm Diſtance Sought = ☉K						10.004747
Half Charact. is Logarithm in my Tables						5.004747

But when the Earth is very near her Aphelion, to the Conſtant Logarithm 85.1748215 add twice the Sine of half the Angular Diſtance of the Earth from her Aphelion, and you will have the Logarithm of a Number, which taken from the Conſtant Logarithm 10.007289, gives the Logarithm Diſtance ſought.

Ex-

Example. June 18, 1732 at Noon, the Sun's Place is in ♋ 7° 48′ 8″ and the M. Anom. 11ˢ. 29° 29′ 36″

Earth's Diſtance from the Aphelion		30 24	
Half		15 12	Sine 7.645423
Double Sine			15.290846
Conſtant Logarithm add			85.174822
Subtract		3	0.465668
Conſtant Logarithm	10.007289		
Diſt. ☾ à ☉ as in my Tables	5.007286		

2. And when the Earth is very near (or within 5° of) her Perihelion, then to the Conſtant Logarithm 85.1599111 add twice the Sine of half the Angular Diſtance from the Perihelion, and you will have the Logarithm of a Number; which added to the Conſtant Logarithm 9.992587, gives the Logarithm-Diſt. ſought.

Then take half the Characteriſtick, and it will be the Logar. Diſt. ☾ à ☉ in my Solar Table.

Example December 18, 1732, at Noon, the Earth's Place is ♋ 8′ 9′ 14″ and her mean Anom. 5ˢ. 29° 51′, 26″; what's the Logarithm of her Diſtance from the Sun?

OPERATION.

	S	°	′	″	
Mean Anomaly	5	29	51	26	
Diſtance from the Perihelion			8	34	
Half			4	17	Sine 7.076577
Double Sine					14.153154
Conſtant Logarithm					85.159911
And the Number				2	313065
To the Conſtant Logarithm	9.992587				
Diſt. ☾ from ☉	9.992589				
Neareſt half Characteriſtick	4.992589				in my Tables.

7. Given, the Logarithm Diſtance of the Earth from the Sun, to find the apparent Semidiameter of the Sun?

Rule.

Rule. From the Conſtant Logarithm 11.2063672, take the Logarithm Diſtance of the Earth from the Sun, and the Remainder is the apparent Semidiameter in Minutes and Decimal Parts.

Example. *Anno* 1726, *April* 29, at Noon, I demand the Sun's apparent Semidiameter?

OPERATION.

Conſtant Logarithm	----	11.2063671
Logarithm of *Earth* from *Sun* ſub.		10.0047470
Sun's Semidiameter 15'.91		1.2016201
	60	
54 60 = 15' 55''		

Example 2. *Anno* 1732, *June* 18, Conſt. Logar. 11.206367
Logarithm-Diſtance *Earth* from *Sun* 10.004286
Suns Appar. Semidiameter 15' 81 1 .199081
60
15 48 60 = 15' 49''

Example 3. *Anno* 1732, *June December* 18, Conſt. Logarithm 11.206367
Logar. Diſt. *Earth* from *Sun* ſubt. 9.992589
Sun's Appar. Semidiameter 16' 36 1.213778
60
21 60 = 16' 22''

8. Given, the Logarithm-Diſtance of the *Earth* from the *Sun*, to find the Apparent hourly Motion of the Sun.

Rule, From the Conſtant Logarithm 20.3116407 ſubtract twice the Logarithm-Diſtance of the *Earth* from the *Sun*, and the Remainder will be the Logarithm of the Apparent hourly Motion of the Sun in Minutes and Decimal Parts.

Example. *Anno* 1726, *June* 29, at Noon.

Conſtant

Conſtant Logarithm		20.3916407
Twice Logar. Diſt. *Earth* from *Sun* Sub.		20.0094940
Sun's Appar. hourly Motion	2′.411	0.3821467
	60	
	24.660 = 2′ 25″.	

Example 2. Let the Sun's true place, his hourly Motion and Apparent Semidiameter be ſought *February* 14. 1732 at Noon: Becauſe 'tis Leap Year, the days from *January* 1, to *February* 15 Incluſive are 46.

	D.	h.	′	″	‴		D.	S.	°	′	″	
As	365	5	49	2	15	: 360° : :	46	: 1	15	20	23	Longitude.
As	365	5	49	2	15	: 63″ : :	46	:			7	Apogeon.

Now

Now see the Work, and mark it well.

		Long. *Earth*. S. ° ′ ″	Aph. *Earth* S. ° ′ ″	Conf. 11.2063671
				9.9959882
Radix	1701	3 20 43 50	9 7 44 30	16.23 1.2103791
	20	0 00 09 04	21 00	60
	4	0 00 01 49	4 12	13.80
Years Compleat	3	11 29 17 00	3 9	☉Sem. 16′ 14″
	2	11 29 31 20	2 6	
	1	11 29 45 40	1 3	Conf. 20.3916407
	1	11 29 45 40	1 3	Sub. 19.9919760
Feb. 14. Biſſextile		1 15 20 23	7	2.51 0.3996647
Mean Place *Earth*		5 04 34 46	9 8 17 10	60
Aphelion ſub.		9 08 17 10		30.60
Mean Anomaly		7 26 17 36		Hor. Mot. 2′ 31″
Doubled		3 22 35 12		
Complement		2 07 24 48	Sine ——	9.9653426
Equ add to M. Ano.		14	Conſt. Log.	39.3909656
∠ at upper Focus		7 26 17 50	2272	39.3563082
			60	
Half		3 28 8 55	13.6320	Equat. add.
Complement		2 1 51 5	10.2716129	
Conſtant Logar.			9.9852934	
Tangent ſub.		61 2 12	10.2569063	
From		180 0 0		
		118 57 48	7ˢ. 27° 55′ 36″	True Anom.
	30)	237 55 36	9 8 17 10	Apog. add.
Elliptic Equat. add		1° 38′	☿ 5 6 12 46	true Place.
True Anom		7ˢ. 27° 55′ 36″	☉ 11 6 12 46	
∠ at up. Focus		7 26 17 50	Sine 9.9200853	
Z		3 24 13 26	.0758588	
X half		1 27 6 43	Co. Sec. .0000439	
Half		1 37 46		
Half		☉ 48 53	Sec. 4.9959880	Log. ☉ à ☿.

CHAP. IX.

To Calculate the true Place of the Moon *more exact than was ever yet done.*

1. BY the laſt Chapter, (or by the Fourth Precept of my *Compleat Syſtem*) find the Sun's true Place to the Equal Time given, with the Logarithm of its Diſtance from the Earth.

2. To the ſame Time, collect the middle Motions of the Moon's Longitude, Apogeon and Node, from the Tables in my *Satellite-Aſtronomy*, as is uſually done.

3. With the Mean Anomaly of the Sun, enter the Table of the Annual Equations of the Moon; and take out the Equations of the Moon's Longitude, Apogeon and Node, which apply to the mean Place of the Moon above found, as the Tables direct, and you will have the middle Places of the Moon's Longitude, Apogeon and Node clear'd off the Annual Equations.

4. From the Place of the Sun, ſubtract the Place of the Moon's Apogeon firſt Equated, and the Remainder is the Annual Argument; with which enter the Table of Equation the Second, and there take out the ſecond Equation of the Moon; which applying to her Place firſt Equated, gives her Place the ſecond time Equated.

5. From the Place of the Sun, take the Place of the Moon's North Node firſt Equated; and this Remainder is the Annual Argument of the Node. With this take out the third Equation, and apply it to the Moon's Place, the ſecond time Equated, gives her Place Equated the third time.

6. From the Place of the Sun, take the Place of the Moon the third time Equated. And from the Place Sun's Apogeon, take the Place of the Moon's Apogeon the firſt time Equated; the Sum of theſe two Remainders call the

Ar-

Argument of the fourth Equation; with this enter the Table of the Fourth Equation; and that anſwering, apply to the Moon's Place the third time equated, gives her Place the 4th time Equated.

7. With the annual Argument (as found in the Fourth hereof) enter the Table, entituled *A Table of the Second Equation of the Moon's Apogeon, and Logarithm of the Eccentricity of her Orb*,, and there take out the Second Equation, which apply to the Apogeon firſt Equated, gives its Place Equated the ſecond time, which is its true Place.

Alſo out of the ſame Table take the Logarithm of the Eccentricity, and reſerve it till anon.

8. From the fourth Equated Place of the Moon, ſubtract the true Place of the Apogeon, and the Remainder is the Moon's Mean Anomaly at that time.

9. To find the *Angle* at the upper Focus of the Ellipſis.

1. To the Conſtant Logarithm 72,933542, add twice the Logarithm of the Eccentricity, and the Sine of twice the Mean Anomaly, and you will have the Logarithm of ſome Minutes, which ſhall

be { added to / ſubtracted from } the Mean Anomaly, when its Double

is { leſs / greater } than 6 Signs.

2. To the Conſtant Logarithm 43.359870 add thrice the Logarithm of the Eccentricity, and thrice the Sine of the mean Anomaly, and you will have the Logarithm of ſome Minutes to be added to the mean Anomaly, if leſs than 6 Signs; but to be ſubtracted, if more; the Sum or Difference is the Angle at the upper Focus of the Ellipſis, which the Moon's Orb forms at that time.

Note, In the firſt of theſe, the Characteriſtick will generally be more than 100, which always reject, and enter the Table of Logarithms with 0 for the Characteriſtick, and then the Minutes will be under 10: But in the ſecond Part it is the Logarithm of the Decimal of a Minute. See theſe two Examples:

N B. Always put two Cyphers before the second, as per Work.

		Logar.		Logar.
	1 507+	0.178114	2.6+	—0.414839
	.006—	97.801979	.007 +	96.843904
Min.	1.501+		'2.607 +	
	60		× 60	
Second,	30.360		"36.420	

10. Seek the Logarithm of the Eccentricity in the Tables of Artificial Tangents, and subtract its corresponding Arch from 45°, and to the Taugent of the Remainder add the Tangent of half the Angle at the upper Focus, and you will have the Tangent of half the true Anomaly.

Note, When the half of the Angle of the upper Focus is more than a Quadrant, then take the fourth proportional Tangent from 180°, and the double of the Remainder is the true Anomaly. The Focus of the Ellipsis of the Moon is shewn in the Scheme, Page 15.

11. To the true Anomaly add the true Place of the Apogeon, and that gives the Place of the Moon the fifth time Equated. Or, take the Difference between the mean Anomaly and the true, and you have the Elliptic Equation; which apply to the fourth Equated Place of the Moon, gives her Place Equated the fifth time, as before.

12. The Variation is best found, as shewn in Page 18. of my *Satellite Astronomy*.

But, however, you may do it thus: Subtract the Sun's Place from the fifth Equated Place of the Moon, and with the Distance enter the Table of Variation, and apply it to the 5th Equated Place of the Moon, gives the Place the 6th time Equated.

13. *Lastly*, Subtract the Sun's true place from the 6th Equated place of the Moon, and with that Remainder enter the Table of the seventh Equation, and take it out answering. Apply this Equation as the Table directs, to the *Moon's* sixth Equated place, and you have her true place in her Orbit.

14.

14. To find the Moon's Latitude and Ecliptic place.]

With the Annual Argument of the Node (as found by the fifth Article hereof.) Enter the Table for computing the Moon's Latitude, and take out the Equation of the Node; which apply (according to its Title) to the firſt Equated place of the Node, gives its true place.

Alſo out of the ſame Table take the Logarithm-Sine of the Inclination of the Moon's Orb to the Ecliptic: For that is accommodated to the Greateſt 5° 17′ 20″ Sine 8.964625 in the Conjunction and Oppoſition; and alſo to the Leaſt 4° 52′ 35″ Sine 8.939693 Inclination in the Quadratures of the Nodes from the Sun; and then ſay,

As Radius
To the Sine of the Inclination,
So is the Sine of the Diſtance of the Moon from the nearest Node,
To the Sine of her preſent Latitude, which

is { North Aſcending } if Arg. { 0 1 2 } Signs
{ North Deſcending } Lat. be { 3 4 5 }

And { South Aſcending } if Arg. { 6 7 8 } Signs.
{ South Deſcending } Lat. be { 9 10 11 }

The Work for the firſt Example ſtands thus:
As Radius — — 90 .. 0 .. 10.000000
To the Sine of the Inclination;
So is the Sine ☽ from neareſt Node,
To Sine Latitude.

15. The Table of Reduction is accommodated to the Mean Inclination of the Lunar Orbit; that is, when the Sun is in the Octants, or 45° Diſtant from the Moon's Nodes; ſo that entring with the Argument of Latitude, you may take out the Reduction anſwering. and apply it to the Orbit Place of the Moon, gives her Place reduced to the Ecliptic: But to have the Reduction perfectly true, it will be beſt to ſay,

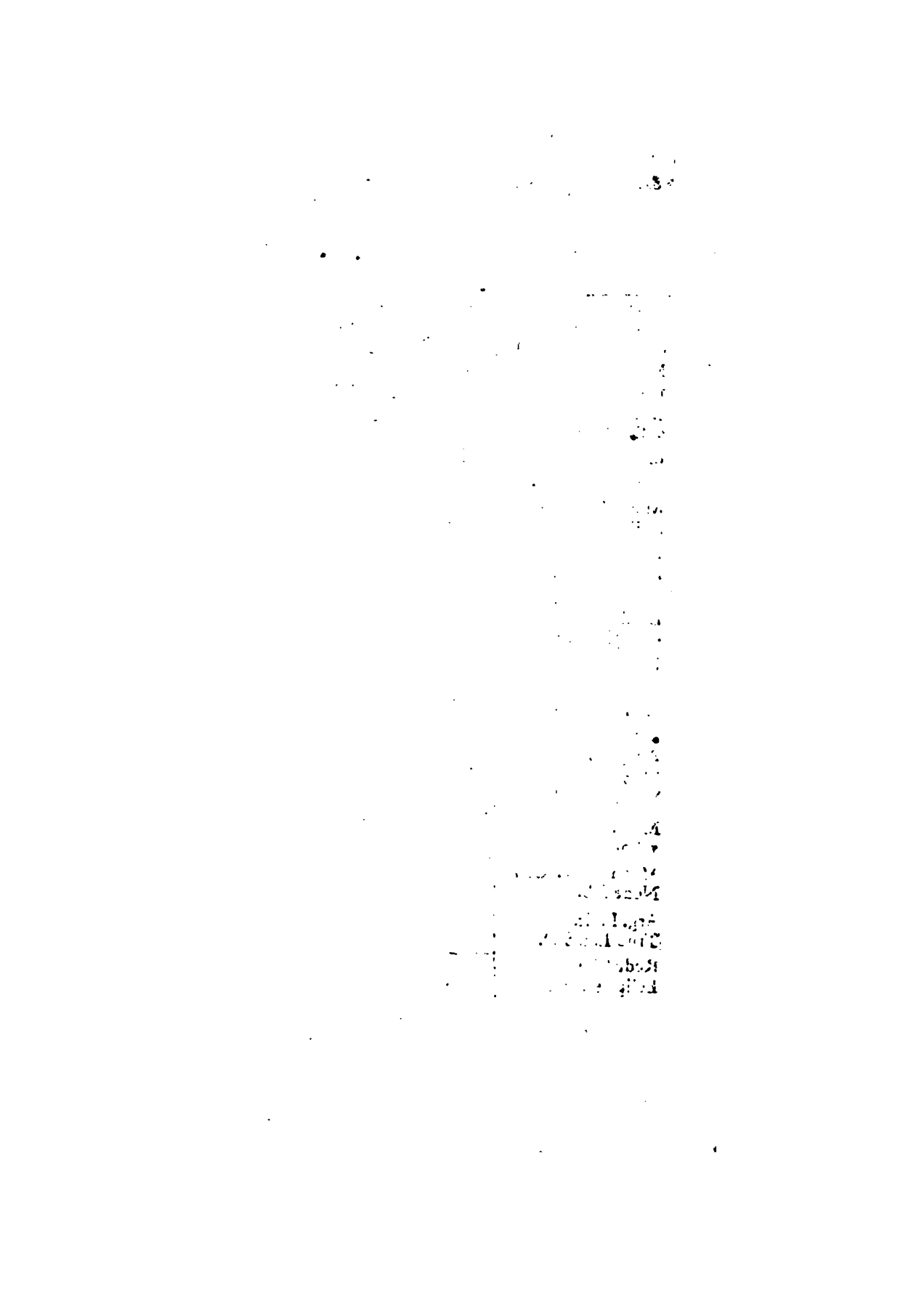
As Radius,
To CS of the Inclination of the Lunar Orbit;
So Tangent of the Argument of Latitude,
To the Tangent of an Arch, which ſubtracted from the Arg. of Lat. leaves the Reduction, which apply to the mean Orbit Place, as above, gives her Ecliptic Place.

First Example *of the* SUN's *Place.*

Equal time	Long. ☉ S. ° ′ ″	Anom. ☉ S. ° ′ ″	An. Argum. S. ° ′ ″	*This belongs to the Moon.*
Anno 1731	9 20 27 52	6 12 11 51	1 27 20 5	1 ☉ 27 20 5
May 7	4 5 10 37	4 5 10 6	4 13 26 58	6 ☽ 27 54 2
Hours 10	24 38	24 38	9 13 53 7	6 29 26 3
Mean Mot.	1 26 3 7	10 17 46 35		10 24 49 34
Equat. add	1 16 58			5 25 15 27
		Log. 5.005462		Arg. 4. Equat
☉'s tr. Place	1 27 20 5			

Second Example *of the* SUN's *Place.*

Equal time	Long. ☉ S. ° ′ ″	Anom. ☉ S. ° ′ ″	An. Argum. S. ° ′ ″	*This belongs to the Moon.*
Anno 1734	9 20 44 1	9 12 24 50	6 4 4 51	6 ☉ 4 4 51
Septemb. 16	8 15 16 57	8 15 16 13	8 29 39 32	6 ☽ 3 19 46
Mean Mot.	6 6 0 58	2 27 41 3	9 4 25 19	0 0 45 5
Equat. ſub.	1 56 7			6 8 40 23
☉'s tr. Place	6 4 4 51	*Log.* 5.000420		6 9 25 28
				Arg. 4. E qu



First Example *of the* Moon's *Place.*

Equal time.	Long. ☽. S. ° ′ ″	Apog. ☽. S. ° ′ ″
Anno 1731	10 29 5 46	3 29 2 1
May — 7	7 23 24 5	14 8 56
Hours 10	5 29 25	2 47
Mean Motion	6 27 59 18	4 13 13 44
1 Equation ſub.	7 48	+ 13 14
☽ Equated	6 27 51 30	4 13 26 58
2 Equation add	1 45	6 58 22
Moon Equated	6 27 53 15	4 6 28 36
3 Equation add	47	L.Ec.8'653279
Moon Equated	6 27 54 2	Db.17.306558
4 Equation add	15	Tr.25.959837
Moon Equated	6 27 54 17	2 34 37 8.655279
Apogeon ſub.	4 6 28 36	45 0 0
Mean Anom.	2 21 25 41	42 25 23: 9.960882
Double	5 12 51 22	4 043 05: 9.934873
Complement	0 17 8 38	38 11 19: 9.893755
Equat. + to M. An.	30	76 22 38 Anom.
Angle upper Focus	2 21 26 11	☽ Inclin. 5°9′4″ 8.95321
Half —	1 10 43 5	☽ à ☊ 76°31′41″ 9.98786
True Anomaly	2 16 22 38	S.Lt.SD 5 0 33 8.94109
Apogeon add	2 10 28 36	For the Reduction.
Moon Equated	6 22 51 14	As *Rad.* 90 0 0 10.000000
Variation ſub.	32 49	To C. *Inc.* 5 9 4 9.998242
Moon Equated	6 22 18 25	Sot. *A. Lat.* 76 31 41 10.620584
7 Equation ſub.	1 20	Tot. — of 76 28 31 10.618826
Moon in her Orb	6 22 17 5	Reduction 0 3 10 add
Node ſub.	9 8 48 46	
Arg. Latit.	9 13 28 19	
True Lat. S.D.	5 0 33	*Eliptic. Equat.* 5° 3′ 3″ ſub.
Reduction add	3 10	
Ecliptic Place	6 22 20 15	

First Example of the Moon's Place.

Node ☽. S. ° ′ ″		
9 17 9 33	Cont. Log.	72.933542
6 43 31	° ′ ″	17.306558
1 19	17 8 38	9.469287
— 6 44 50	.5124 +	99.709587
9 10 24 43		43.359870
— 6 17	° ′ ″	25.959837
9 Ω 10 18 26	81 25 41	29.985363
1 ☉ 27 20 5	.0020019	99.305070
4 17 1 39	.514319	
	X60	
— 1 29 40	30.865140 +	
9 Ω 8 48 46	6 ☽ 22 51 14	
	1 ☉ 27 20 5	
	4 25 31 9	
	Arg. 6 Equat.	
	6 ☽ 22 18 25	
	1 ☉ 27 20 5	
	4 24 58 20	
	Arg. 7 Equat.	

Second Example of the Moon's *Place.*

Equal time.	Long. ☽ S. ° ′ ″	Apog. ☽ S. ° ′ ″	
Anno 1724	0 10 25 33	3 1 8 13	
September 16	5 22 41 10	0 28 51 17	
Mean Motion	6 3 6 43	8 29 59 30	
1 Equation	ſub. 11 48	add 19 58	
☽ equated	6 3 18 31	8 29 39 32	
2 Equation	ſub. 34	add 2 22 13	
Moon equated	6 3 19 5	8 27 17 19	
3 Equation	ſub. 41	L. Ecc. 8.638505	
Moon equated	6 3 19 46	Doub. 17.277010	
4 Equation	— 23	Trip. 25.915515	
Moon equated	6 3 19 23	*t.* 42 30 32	9.962187
Apog. ſub.	8 27 17 19	*t.* 41 59 8	9.954217
Mean Anom.	9 6 2 4	*t.* 39 31 9	9.916404
Double	6 12 4 8	180 0 0	
Equ. ſub. à *M. A.*	20	140 28 51	
∠ upper Focus	9 6 1 44	280 57 42	True Anom
Half —	4 18 0 52		
Complement	1 11 59 8		
True Anomaly	9 10 57 42		
Apogeon add	8 27 17 19	S. Incl. 5° 12′ 29″	8.95797
Moon equated	6 8 15 1	S. ☽ à ☊ 25 52 57	9.640011
Variation	ſub. 5 6	S. Lt. *S. D.* 2 16 16	8.597981
Moon equated	6 8 20 7		
7 Equation	add 10	As Rad. 90 00 0	-10.000000
☽ in her Orb	6 8 19 57	*To C. S. Inc.* 5 12 29	9.998203
Node ſub.	7 4 12 54	So *t. A. Lt* 25 52 57	9.685918
Arg. Lat.	11 4 7 3	To *t.* of 25 52 57	9.684121
True Lat. S. D.	2 16 16	*Reduction* 0 5 35	
Reduction add	0 5 35		
Ecliptic Place	6 8 25 32	Ellip. Eq. 4 55 38	add

Second

Second Example of the Moon's *Place.*

Node ☽			
S.	°	′	″
7	19	7	13
	13	42	56
7	5	24	17
	add	9	29
7 ☊	5	33	46
6 ☉	4	4	51
10	28	31	5
8	2	29	28
	45	00	00
	42	30	32
Equ. —	1	20	52
7 ☊	4	12	54

Conſt. Log.	72.933542
	17.277010
12° 4′ 8″ —	9.320328
l. 3395 —	99.530880
	43.359870
	25.915515
83° 57′ 56″	29.993760
.001859 —	99.269145
.341359 Z —	
60	
″20.481540 —	

6 ☽	8	15	1
6 ☉	4	4	51
0	4	10	10
6 ☽	8	20	7
6 ☉	8	4	51
0	4	15	16

A Table *of the first, or Annual Equation of the* Moon.

Mean Anomaly of the Sun.

Anom. ☉	Sign 0						Sign 1						Anom. ☉
	Long. ☽ add		Apog. ſub.		Nod. add		Long. ☽ add		Apog. ſub.		Node add		
	′	″	′	″	′	″	′	″	′	″	′	″	
0	0	1	0	0	0	0	5	47	9	49	4	40	30
1	0	12	0	20	0	9	5	58	10	7	4	48	29
2	0	24	0	41	0	19	6	9	10	24	4	57	28
3	0	36	1	1	0	29	6	19	10	42	5	5	27
4	0	48	1	22	0	39	6	29	10	59	5	13	26
5	1	00	1	42	0	48	6	39	11	16	5	21	25
6	1	12	2	3	0	58	6	49	11	33	5	29	24
7	1	24	2	23	1	8	6	59	11	49	5	37	23
8	1	36	2	43	1	18	7	9	12	6	5	45	22
9	1	48	3	4	1	27	7	19	12	22	5	53	21
10	1	59	3	24	1	37	7	28	12	39	6	0	20
11	2	11	3	44	1	46	7	37	12	55	6	8	19
12	2	23	4	4	1	56	7	46	13	10	6	15	18
13	2	35	4	24	2	5	7	55	13	26	6	22	17
14	2	46	4	44	2	15	8	4	13	41	6	30	16
15	2	51	5	4	2	24	8	13	13	56	6	37	15
16	3	10	5	24	2	34	8	22	14	10	6	44	14
17	3	22	5	44	2	43	8	31	14	25	6	50	13
18	3	34	6	3	2	53	8	39	14	39	6	57	12
19	3	46	6	23	3	2	8	47	14	53	7	4	11
20	3	57	6	43	3	11	8	55	15	7	7	11	10
21	4	2	7	2	3	20	9	3	15	21	7	17	9
22	4	20	7	21	3	29	9	11	15	33	7	23	8
23	4	31	7	40	3	38	9	19	15	46	7	29	7
24	4	42	7	59	3	47	9	27	15	58	7	35	6
25	4	53	8	18	3	56	9	34	16	11	7	41	5
26	5	4	8	36	4	5	9	41	16	23	7	46	4
27	5	15	8	54	4	14	9	47	16	35	7	52	3
28	5	26	9	13	4	23	9	54	16	46	7	58	2
29	5	37	9	31	4	31	10	1	16	57	8	4	1
30	5	47	9	49	4	40	10	7	17	8	8	9	0
	ſub.		add		ſub.		ſub.		add		ſub.		
	Sign 11						Sign 10						

A Table of the first, or Annual Equation of the Moon.

Mean Anomaly of the SUN.

Anom. ☉	Sign 2 Long. ☽ add	Apog. sub.	Node add	Sign 3 Long. ☽ add	Apog. sub.	Node add	Anom. ☉
	° ′	′ ″	′ ″	′ ″	′ ″	′ ″	
0	20 7	17 8	8 9	11 49	20 0	9 30	30
1	20 14	17 19	8 14	11 49	20 0	9 30	29
2	20 20	17 29	8 19	11 49	20 0	9 30	28
3	20 26	17 39	8 24	11 48	19 59	9 30	27
4	20 31	17 48	8 28	11 48	19 58	9 29	26
5	20 37	17 38	8 32	11 47	19 57	9 29	25
6	20 42	18 7	8 36	11 47	19 56	9 28	24
7	20 47	18 16	8 40	11 45	19 54	9 27	23
8	20 52	18 24	8 44	11 44	19 51	9 26	22
9	20 56	18 32	8 48	11 42	19 49	9 25	21
10	21 1	18 39	8 52	11 41	19 46	9 24	20
11	21 5	18 46	8 55	11 39	19 42	9 22	19
12	21 9	18 53	8 58	11 36	19 38	9 20	18
13	21 14	19 0	9 2	11 34	19 34	9 18	17
14	21 19	19 6	9 5	11 31	19 30	9 16	16
15	21 22	19 12	9 7	11 29	19 25	9 14	15
16	21 25	19 18	9 10	11 25	19 20	9 12	14
17	21 28	19 23	9 12	11 22	19 14	9 9	13
18	21 30	19 28	9 15	11 19	19 8	9 6	12
19	21 32	19 33	9 17	11 15	19 2	9 3	11
20	21 35	19 37	9 19	11 11	18 55	8 59	10
21	21 38	19 41	9 21	11 6	18 48	8 56	9
22	21 40	19 44	9 22	11 2	18 41	8 52	8
23	21 42	19 48	9 24	10 58	18 33	8 49	7
24	21 43	19 51	9 25	10 53	18 25	8 45	6
25	21 45	19 53	9 26	10 48	18 17	8 41	5
26	21 46	19 55	9 27	10 43	18 8	8 37	4
27	21 47	19 57	9 28	10 38	17 59	8 33	3
28	21 48	19 58	9 29	10 32	17 50	8 28	2
29	21 48	19 59	9 29	10 36	17 40	8 23	1
30	21 49	20 0	9 30	10 21	17 30	8 19	0
	sub.	add	sub.	sub.	add	sub.	
	Sign 8			Sign 7			

A Table *of the first, or Annual Equation of the* Moon

Mean Anomoly of the SUN.

Anom. ☉	Sign. 4. Long. ☽ add		Apog. ſub.		Node add		Sign 5. Long. ☽ add		Apog. ſub.		Node add		Anom. ☉
	′	″	′	″	′	″	′	″	′	″	′	″	
0	10	21	17	30	8	19	6	0	10	11	4	50	30
1	10	15	17	20	8	14	5	49	9	52	4	41	29
2	10	7	17	9	8	9	5	38	9	33	4	32	28
3	10	1	16	58	8	4	5	27	9	15	4	23	27
4	9	55	16	46	7	58	5	16	8	56	4	14	26
5	9	47	16	34	7	53	5	5	8	34	4	5	25
6	9	40	16	23	7	48	4	53	8	17	3	56	24
7	9	33	16	11	7	42	4	42	7	58	3	47	23
8	9	26	15	58	7	35	4	30	7	38	3	38	22
9	9	19	15	45	7	29	4	18	7	18	3	29	21
10	9	11	15	32	7	23	4	6	6	58	3	19	20
11	9	2	15	18	7	16	3	54	6	38	3	9	19
12	8	54	15	4	7	9	3	43	6	18	2	59	18
13	8	46	14	50	7	3	3	31	5	58	2	50	17
14	8	37	14	36	6	56	3	19	5	38	2	40	16
15	8	28	14	21	6	49	3	7	5	17	2	30	15
16	8	20	14	6	6	42	2	54	4	56	2	20	14
17	8	11	13	51	6	35	2	42	4	35	2	10	13
18	8	1	13	35	6	27	2	30	4	14	2	0	12
19	7	52	13	20	6	20	2	18	3	54	1	50	11
20	7	43	13	4	6	12	2	5	3	33	1	40	10
21	7	34	12	48	6	4	1	52	3	12	1	30	9
22	7	24	12	31	5	56	1	40	2	51	1	20	8
23	7	14	12	15	5	49	1	28	2	30	1	10	7
24	7	3	11	58	5	41	1	15	2	8	1	0	6
25	6	53	11	41	5	33	1	2	1	46	0	50	5
26	6	43	11	23	5	24	0	49	1	25	0	40	4
27	6	33	11	5	5	16	0	37	1	4	0	30	3
28	6	22	10	47	5	8	0	25	0	43	0	20	2
29	6	11	10	29	4	59	0	12	0	21	0	10	1
30	6	0	10	11	4	50	0	0	0	0	0	0	0
	ſub.		add		ſub.		ſub		add.		ſub.		
	Sign 7.						Sign 6.						

A Table of the Second Equation of the Moon.

Ann. Arg.	Annual Argument. Sign 0 6 sub.		1 7 sub.		2 8 sub.		Ann. Arg.
	′	″	′	″	′	″	
0	0	0	3	15	3	15	30
1	0	8	3	19	3	11	29
2	0	16	3	22	3	6	28
3	0	23	3	25	3	2	27
4	0	31	3	28	2	57	26
5	0	39	3	31	2	52	25
6	0	47	3	34	2	47	24
7	0	54	3	36	2	41	23
8	1	2	3	38	2	36	22
9	1	9	3	40	2	30	21
10	1	17	3	42	2	24	20
11	1	24	3	43	2	18	19
12	1	31	3	44	2	12	18
13	1	38	3	44	2	5	17
14	1	46	8	45	1	59	16
15	1	52	3	45	1	52	15
16	1	59	3	45	1	46	14
17	2	5	3	44	1	28	13
18	2	12	3	44	1	31	12
19	2	18	3	43	1	24	11
20	2	24	3	42	1	17	10
21	2	30	3	40	1	9	9
22	2	36	3	38	1	2	8
23	2	41	3	36	0	54	7
14	2	47	3	34	0	47	6
25	2	52	3	31	0	39	5
26	2	57	3	28	0	31	4
27	3	2	3	25	0	24	3
28	3	6	3	22	0	16	2
29	3	11	3	19	0	8	1
30	3	15	3	15	0	0	0
	Si. 11. 5 add		Si. 10. 4 add		9 3 add		

A Table *of the firſt, or Annual Equation of the* Moon.

Mean Anomaly of the Sun.

Anom. ☉	Sign 0						Sign 1						Anom. ☉
	Long. ☽ add		Apog. ſub.		Nod. add		Long. ☽ add		Apog. ſub.		Node add		
	°	′ ″	°	′ ″	°	′ ″	°	′ ″	°	′ ″	°	′ ″	
0	0	1	0	0	0	0	5	47	9	49	4	40	30
1	0	12	0	20	0	9	5	58	10	7	4	48	29
2	0	24	0	41	0	19	6	9	10	24	4	57	28
3	0	36	1	1	0	29	6	19	10	42	5	5	27
4	0	48	1	22	0	39	6	29	10	59	5	13	26
5	1	00	1	42	0	48	6	39	11	16	5	21	25
6	1	12	2	3	0	58	6	49	11	33	5	29	24
7	1	24	2	23	1	8	6	59	11	49	5	37	23
8	1	36	2	43	1	18	7	9	12	6	5	45	22
9	1	48	3	4	1	27	7	19	12	22	5	53	21
10	1	59	3	24	1	37	7	28	12	39	6	0	20
11	2	11	3	44	1	46	7	37	12	55	6	8	19
12	2	23	4	4	1	56	7	46	13	10	6	15	18
13	2	35	4	24	2	5	7	55	13	26	6	22	17
14	2	46	4	44	2	15	8	4	13	41	6	30	16
15	2	51	5	4	2	24	8	13	13	56	6	37	15
16	3	10	5	24	2	34	8	22	14	10	6	44	14
17	3	22	5	44	2	43	8	31	14	25	6	50	13
18	3	34	6	3	2	53	8	39	14	39	6	57	12
19	3	46	6	23	3	2	8	47	14	53	7	4	11
20	3	57	6	43	3	11	8	55	15	7	7	11	10
21	4	2	7	2	3	20	9	3	15	21	7	17	9
22	4	20	7	21	3	29	9	11	15	33	7	23	8
23	4	31	7	40	3	38	9	19	15	46	7	29	7
24	4	42	7	59	3	47	9	27	15	58	7	35	6
25	4	53	8	18	3	56	9	34	16	11	7	41	5
26	5	4	8	36	4	5	9	41	16	23	7	46	4
27	5	15	8	54	4	14	9	47	16	35	7	52	3
28	5	26	9	13	4	23	9	54	16	46	7	58	2
29	5	37	9	31	4	31	10	1	16	57	8	4	1
30	5	47	9	49	4	40	10	7	17	8	8	9	0
	ſub.		add		ſub.		ſub.		add		ſub.		
	Sign 11						Sign 10						

A Table *of the first, or Annual Equation of the* Moon.

Mean Anomaly of the SUN.

Anom. ☉	Sign 2			Sign 3			Anom. ☉
	Long. ☽ add	Apog. sub.	Node add	Long. ☽ add	Apog. sub.	Node add	
	° ′	′ ″	′ ″	° ′	′ ″	′ ″	
0	20 7	17 8	8 9	11 49	20 0	9 30	30
1	10 14	17 19	8 14	11 49	20 0	9 30	29
2	10 20	17 29	8 19	11 49	20 0	9 30	28
3	10 26	17 39	8 24	11 48	19 59	9 30	27
4	10 31	17 48	8 28	11 48	19 58	9 29	26
5	10 37	17 38	8 32	11 47	19 57	9 29	25
6	10 42	18 7	8 36	11 47	19 56	9 28	24
7	10 47	18 16	8 40	11 45	19 54	9 27	23
8	10 52	18 24	8 44	11 44	19 51	9 26	22
9	10 56	18 32	8 48	11 42	19 49	9 25	21
10	11 1	18 39	8 52	11 41	19 46	9 24	20
11	11 5	18 46	8 55	11 39	19 42	9 22	19
12	11 9	18 53	8 58	11 36	19 38	9 20	18
13	11 14	19 0	9 2	11 34	19 34	9 18	17
14	11 19	19 6	9 5	11 31	19 30	9 16	16
15	11 22	19 12	9 7	11 29	19 25	9 14	15
16	11 25	19 18	9 10	11 25	19 20	9 12	14
17	11 28	19 23	9 12	11 22	19 14	9 9	13
18	11 30	19 28	9 15	11 19	19 8	9 6	12
19	11 32	19 33	9 17	11 15	19 2	9 3	11
20	11 35	19 37	9 19	11 11	18 55	8 59	10
21	11 38	19 41	9 21	11 6	18 48	8 56	9
22	11 40	19 44	9 22	11 2	18 41	8 52	8
23	11 42	19 48	9 24	10 58	18 33	8 49	7
24	11 43	19 51	9 25	10 53	18 25	8 45	6
25	11 45	19 53	9 26	10 48	18 17	8 41	5
26	11 46	19 55	9 27	10 43	18 8	8 37	4
27	11 47	19 57	9 28	10 38	17 59	8 33	3
28	11 48	19 58	9 29	10 32	17 50	8 28	2
29	11 48	19 59	9 29	10 36	17 40	8 23	1
30	11 49	20 0	9 30	10 21	17 30	8 19	0
	sub.	add	sub.	sub.	add	sub.	
	Sign 8			Sign 7			

A Table *of the first, or Annual Equation of the* Moon

Mean Anomoly of the SUN.

Anom. ☉	Sign. 4. Long. ☽ add		Apog. ſub.		Node add		Sign 5. Long. ☽ add		Apog. ſub.		Node add		Anom. ☉
	′	″	′	″	′	″	′	″	′	″	′	″	
0	10	21	17	30	8	19	6	0	10	11	4	50	30
1	10	15	17	20	8	14	5	49	9	52	4	41	29
2	10	7	17	9	8	9	5	38	9	33	4	32	28
3	10	1	16	58	8	4	5	27	9	15	4	23	27
4	9	55	16	46	7	58	5	16	8	56	4	14	26
5	9	47	16	34	7	53	5	5	8	34	4	5	25
6	9	40	16	23	7	48	4	53	8	17	3	56	24
7	9	33	16	11	7	42	4	42	7	58	3	47	23
8	9	26	15	58	7	35	4	30	7	38	3	38	22
9	9	19	15	45	7	29	4	18	7	18	3	29	21
10	9	11	15	32	7	23	4	6	6	58	3	19	20
11	9	2	15	18	7	16	3	54	6	38	3	9	19
12	8	54	15	4	7	9	3	43	6	18	2	59	18
13	8	46	14	50	7	3	3	31	5	58	2	50	17
14	8	37	14	36	6	56	3	19	5	38	2	40	16
15	8	28	14	21	6	49	3	7	5	17	2	30	15
16	8	20	14	6	6	42	2	54	4	56	2	20	14
17	8	11	13	51	6	35	2	42	4	35	2	10	13
18	8	1	13	35	6	27	2	30	4	14	2	0	12
19	7	52	13	20	6	20	2	18	3	54	1	50	11
20	7	43	13	4	6	12	2	5	3	33	1	40	10
21	7	34	12	48	6	4	1	52	3	12	1	30	9
22	7	24	12	31	5	56	1	40	2	51	1	20	8
23	7	14	12	15	5	49	1	28	2	30	1	10	7
24	7	3	11	58	5	41	1	15	2	8	1	0	6
25	6	53	11	41	5	33	1	2	1	46	0	50	5
26	6	43	11	23	5	24	0	49	1	25	0	40	4
27	6	35	11	5	5	16	0	37	1	4	0	30	3
28	6	22	10	47	5	8	0	25	0	43	0	20	2
29	6	11	10	29	4	59	0	12	0	21	0	10	1
30	6	0	10	11	4	50	0	0	0	0	0	0	0
	ſub.		add		ſub.		ſub		add.		ſub.		
	Sign 7.						Sign 6.						

A Table *of the Second Equation of the* Moon.

Ann. Arg.	Annual Argument. Sign 0 6 sub.		1 7 sub.		2 8 sub.		Ann. Arg.
	′	″	′	″	′	″	
0	0	0	3	15	3	15	30
1	0	8	3	19	3	11	29
2	0	16	3	22	3	6	28
3	0	23	3	25	3	2	27
4	0	31	3	28	2	57	26
5	0	39	3	31	2	52	25
6	0	47	3	34	2	47	24
7	0	54	3	36	2	41	23
8	1	2	3	38	2	36	22
9	1	9	3	40	2	30	21
10	1	17	3	42	2	24	20
11	1	24	3	43	2	18	19
12	1	31	3	44	2	12	18
13	1	38	3	44	2	5	17
14	1	46	8	45	1	59	16
15	1	52	3	45	1	52	15
16	1	59	3	45	1	46	14
17	2	5	3	44	1	28	13
18	2	12	3	44	1	31	12
19	2	18	3	43	1	24	11
20	2	24	3	42	1	17	10
21	2	30	3	40	1	9	9
22	2	36	3	38	1	2	8
23	2	41	3	36	0	54	7
14	2	47	3	34	0	47	6
25	2	52	3	31	0	39	5
26	2	57	3	28	0	31	4
27	3	2	3	25	0	24	3
28	3	6	3	22	0	16	2
29	3	11	3	19	0	8	1
30	3	15	3	15	0	0	0
	Si. 11. 5 add		Si. 10. 4 add		9 3 add		

A Table of the third Equation of the Moon.

Ann. Arg. I	Dist. of Sun from Node. Sign 0 6 Sub. ′ ″	1 7 Sub. ′ ″	2 8 Sub. ′ ″	Ann. Arg. II
0	0 0	0 41	0 41	30
1	0 1	0 41	0 40	29
2	0 3	0 42	0 39	28
3	0 5	0 43	0 38	27
4	0 6	0 43	0 37	26
5	0 8	0 44	0 36	25
6	0 10	0 45	0 35	24
7	0 11	0 45	0 34	23
8	0 13	0 45	0 32	22
9	0 14	0 46	0 31	21
10	0 16	0 46	0 30	20
11	0 17	0 46	0 29	19
12	0 19	0 47	0 27	18
13	0 20	0 47	0 26	17
14	0 22	0 47	0 25	16
15	0 23	0 47	0 23	15
16	0 25	0 47	0 22	14
17	0 26	0 47	0 20	13
18	0 27	0 47	0 19	12
19	0 29	0 46	0 17	11
20	0 30	0 46	0 16	10
21	0 31	0 49	0 14	9
22	0 32	0 45	0 13	8
23	0 34	0 45	0 11	7
24	0 35	0 44	0 10	6
25	0 36	0 44	0 8	5
26	0 37	0 43	0 6	4
25	0 38	0 43	0 5	3
28	0 39	0 42	0 3	2
29	0 40	0 41	0 1	1
30	0 41	0 41	0 0	0
	11 5 Add.	10 4 Add.	9 3 Add.	

A Table of the Fourth Equation of the Moon.

Ann. Arg.	Argument 4th Equation. Si. {0+ 6−}		Si. {1+ 7−}		Si. {2+ 8−}		Ann. Arg.
	′	″	′	″	′		
0	0	0	1	12	2	5	30
1	0	2	1	15	2	7	29
2	0	5	1	17	2	8	28
3	0	7	1	19	2	9	27
4	0	10	1	21	2	10	26
5	0	12	1	23	2	11	25
6	0	15	1	25	2	12	24
7	0	17	1	27	2	13	23
8	0	20	1	29	2	14	22
9	0	22	1	31	2	15	21
10	0	25	1	33	2	16	20
11	0	27	1	35	2	17	19
12	0	30	1	37	2	17	18
13	0	32	1	39	2	18	17
14	0	35	1	41	2	19	16
15	0	37	1	43	2	20	15
16	0	40	1	44	2	20	14
17	0	42	1	46	2	21	13
18	0	44	1	48	2	21	12
19	0	46	1	49	2	22	11
20	0	49	1	51	2	22	10
21	0	51	1	52	2	23	9
22	0	54	1	54	2	23	8
23	0	56	1	55	2	24	7
24	0	59	1	57	2	24	6
25	1	1	1	58	2	24	5
26	1	3	2	0	2	24	4
27	1	5	2	1	2	25	3
28	1	8	2	3	2	25	2
29	1	10	2	4	2	25	1
30	1	12	2	5	2	25	0
	11 sub.		10 sub.		9 sub.		
	5 Add		4 add.		3 add.		

A Table *of the Second Equation of the* Moon's Apogeon, *wi the Logarithm of the Eccentricity of her Orb.*

An. Arg.	Signs 0			6. Logarirh.	Ann. Arg.
	Equation add.				
	0	'	"		
0	0	00	00	8.824629	30
1	0	21	04	8.824590	29
2	0	42	08	8.824475	28
3	1	03	10	8.824284	27
4	1	24	09	8.824016	26
5	1	45	05	8.823671	25
6	2	05	57	8.823252	24
7	2	26	44	8.822753	23
8	2	47	25	8.822179	22
9	3	08	00	8.821529	21
10	3	28	27	8.820803	20
11	3	48	46	8.820001	19
12	4	08	55	8.819124	18
13	4	28	54	8.818170	17
14	4	48	42	8.817142	16
15	5	08	19	8.816038	15
16	5	27	43	8.814858	14
17	5	46	53	8.813604	13
18	6	05	48	8.812275	12
19	6	24	27	8.810873	11
20	6	42	50	8.809397	10
21	7	00	56	8.807847	9
22	7	18	44	8.806223	8
23	7	36	12	8.804528	7
24	7	53	20	8.802760	6
25	8	10	06	8.800920	5
26	8	26	29	8.799009	4
27	8	42	29	8.797028	3
28	8	58	05	8.794978	2
29	9	13	16	8.792857	1
30	9	27	57	8.790668	0
	Signs	11		5 ſub.	

The Table *of the Second Equation of the Moon's Apogeon, with the Logarithm of the Eccentricity of her Orb, continued.*

An. Arg.	Signs 1 — Equation add. ° ′ ″	Logar.	An. Arg.
0	9 27 57	8.790668	30
1	9 42 12	8.788412	29
2	9 55 58	8.786089	28
3	10 09 14	8.783371	27
4	10 21 58	8.781248	26
5	10 34 09	8.778732	25
6	10 45 47	8.776153	24
7	10 56 49	8.773513	23
8	11 07 15	8.770814	22
9	11 17 04	8.768057	21
10	11 26 14	8.765243	20
11	11 34 43	8.762375	19
12	11 42 31	8.759454	18
13	11 49 36	8.756482	17
14	11 55 57	8.753461	16
15	12 01 33	8.750395	15
16	12 06 22	8.747248	14
17	12 10 23	8.744131	13
18	12 13 35	8.740941	12
19	12 15 56	8.737714	11
20	12 17 24	8.734455	10
21	12 17 59	8.731167	9
22	12 17 40	8.727853	8
23	12 16 25	8.724518	7
24	12 14 13	8.721164	6
25	12 11 02	8.717796	5
26	12 06 52	8.714419	4
27	12 01 42	8.711037	3
28	11 55 31	8.707654	2
29	11 48 17	8.704277	1
30	11 40 00	8.700910	0
	Sign 10	4 ſub.	

A Table *of the Second Equation of the* Moon's Apogeon, wi
the Logarithm of the Eccentricity of her Orb.

An. Arg.	Signs 2			8.	Ann. Arg.
	Equation add.			Logarirh.	
	o	'	"		
0	11	40	00	8.700910	30
1	11	30	39	8.697559	29
2	11	20	14	8.694229	28
3	11	8	44	8.690927	27
4	10	56	8	8.687658	26
5	10	42	26	8.684430	25
6	10	27	38	8.681247	24
7	10	11	45	8.678118	23
8	9	54	47	8.675051	22
9	9	36	44	8.672049	21
10	9	17	37	8.669121	20
11	8	57	25	8.666277	19
12	8	36	11	8.663520	18
13	8	13	56	8.660861	17
14	7	50	42	8.658305	16
15	7	26	29	8.655859	15
16	7	1	21	8.653532	14
17	6	35	19	8.651331	13
18	6	08	26	8.649261	12
19	5	40	45	8.647329	11
20	5	12	18	8.645542	10
21	4	43	10	8.643906	9
22	4	13	23	8.642426	8
23	3	43	01	8.641108	7
24	3	12	09	8.639954	6
25	2	40	49	8.638973	5
26	2	09	07	8.638164	4
27	1	37	06	8.637532	3
28	1	04	52	8.637079	2
29	0	32	28	8.636806	1
30	0	00	00	8.636715	0
	Signs		9	3 ſub.	

A Table of the Moon's Variation.

☽ ☌ ☉	0 Sign 6 add. ′	″	1 Sign 7 add. ′	″	2 Sign 8 add. ′	″	☽ ☌ ☉
0	0	00	30	27	30	27	30
1	1	14	31	03	29	49	29
2	2	27	31	36	29	09	28
3	3	40	32	07	28	27	27
4	4	54	32	36	27	43	26
5	6	06	33	03	26	56	25
6	7	19	33	27	26	08	24
7	8	30	33	48	25	18	23
8	9	41	34	07	24	26	22
9	10	52	34	24	23	32	21
10	12	02	34	38	22	36	20
11	13	10	34	50	21	39	19
12	14	18	34	59	20	40	18
13	15	25	35	05	19	40	17
14	16	30	35	09	18	38	16
15	17	35	35	10	17	35	15
16	18	38	35	09	16	30	14
17	19	40	35	05	15	25	13
18	20	40	34	54	14	18	12
19	21	39	34	50	13	10	11
20	22	36	34	38	12	02	10
21	23	32	34	24	10	32	9
22	24	26	34	07	9	41	8
23	25	18	33	48	8	30	7
24	26	08	33	27	7	19	6
25	26	56	33	03	6	06	5
26	27	43	32	26	4	54	4
27	28	27	32	07	3	40	3
28	29	09	31	36	2	27	2
29	29	49	31	03	1	14	1
30	30	27	30	27	0	00	0
	11	5	10	4	9	13	
	sub.		sub.		sub.		

A Table of the Seventh Equation of the Moon.

☽ ☌ ☉	Sub. 0 Add. 6 ° ′ ″	Sub. 1 Add 7 ° ′ ″	Sub. 2 Add 8 ° ′ ″	☽ ☌ ☉
0	0 00	1 10	2 01	30
1	0 03	1 12	2 04	29
2	0 05	1 14	2 05	28
3	0 07	1 16	2 06	27
4	0 10	1 18	2 07	26
5	0 12	1 20	2 08	25
6	0 15	1 22	2 09	24
7	0 17	1 24	2 10	23
8	0 19	1 26	2 11	22
9	0 22	1 28	2 12	21
10	0 24	1 30	2 12	20
11	0 27	1 32	2 13	19
12	0 29	1 34	2 14	18
13	0 32	1 36	2 14	17
14	0 34	1 38	2 15	16
15	0 36	1 39	2 15	15
16	0 39	1 41	2 16	14
17	0 41	1 43	2 16	13
18	0 44	1 44	2 17	12
19	0 46	1 46	2 17	11
20	0 48	1 47	2 18	10
21	0 51	1 49	2 18	9
22	0 53	1 50	2 19	8
23	0 55	1 52	2 19	7
24	0 57	1 53	2 19	6
25	0 59	1 55	2 20	5
26	1 02	1 56	2 20	4
27	1 04	1 57	2 20	3
28	1 06	1 59	2 20	2
29	1 08	2 00	2 20	1
30	1 10	2 01	2 20	0
	Sub. 5 Add. 11	Sub. 4 Add 10	Sub. 3 Add 9	

A Table *of the Second Equation of the Moon's Node, with the Logarithm-Sine of the Inclination of her Orbit.*

Mean Diſtance of the Sun from the Node

☉ ☊ ☽	Signs 0			6	☉ ☊ ☽
	Equation add			Logar. Sine	
	°	′	″	° ′ ″	
0	0	00	00	8.964625	30
1	0	03	13	8.96461	29
2	0	06	26	8.96459	28
3	0	09	38	8.96456	27
4	0	12	49	8.96451	26
5	0	16	00	8.96444	25
6	0	19	09	8.96436	24
7	0	22	16	8.96426	23
8	0	25	22	8.96415	22
9	0	28	26	8.96403	21
10	0	31	28	8.96390	20
11	0	34	27	8.96375	19
12	0	37	24	8.96358	18
13	0	40	17	8.96340	17
14	0	43	07	8.96321	16
15	0	45	54	8.96300	15
16	0	48	38	8.96278	14
17	0	51	17	8.96255	13
18	0	53	53	8.96231	12
19	0	56	24	8.96205	11
20	0	58	51	8.96178	10
21	1	01	14	8.96150	9
22	1	03	32	8.96121	8
23	1	05	44	8.96091	7
24	1	07	52	8.96060	6
25	1	09	55	8.96028	5
26	1	11	53	8.95995	4
27	1	13	43	8.95960	3
28	1	15	29	8.95925	2
29	1	17	13	8.95889	1
30	1	18	44	8.95853	0
	Signs 11,			5 ſub.	

A Table *of the Second Equation of the Moon's Node, and the Logarithm-Sine of the Inclination of her Orbit.*

Mean Diſtance of the Sun from the Node

☉ ☊ ☽	Signs 1			7	☉ ☊ ☽
	Equation add			Logar. Sine	
	°	′	″	° ′ ″	
0	1	18	44	8.95853	30
1	1	20	12	8.95816	29
2	1	21	35	8.95777	28
3	1	22	51	8.95737	27
4	1	24	01	8.95698	26
5	1	25	04	8.95658	25
6	1	26	01	8.95617	24
7	1	26	52	8.95576	23
8	1	27	37	8.95534	22
9	1	28	14	8.95492	21
10	1	28	46	8,95450	20
11	1	29	10	8.95407	19
12	1	29	28	8.95363	18
13	1	29	40	8.95320	17
14	1	29	45	8.95277	16
15	1	29	43	8.95234	15
16	1	29	35	8.95190	14
17	1	29	21	8.95147	13
18	1	28	59	8.95104	12
19	1	28	32	8.95060	11
20	1	27	58	8.95017	10
21	1	27	17	8.94974	9
22	1	26	31	8.94931	8
23	1	25	38	8.94889	7
24	1	24	39	8.94847	6
25	1	23	34	8.94806	5
26	1	22	23	8.94764	4
27	1	21	06	8.94724	3
28	1	19	44	8.94684	2
29	1	18	16	8.94645	1
30	1	16	42	8.94605	0
	Signs 16			4 lub.	

A Table *of the Second Equation of the Moon's Node, with the Logarithm-Sine of the Inclination of her Orbit.*

Mean Distance of the Sun from the Node.

☉ ☊ ☋	Signs 2			8	☉ ☊ ☋
	Equation add.			Logar. Sine.	
	°	′	″	° ′ ″	
0	1	16	42	8.94605	30
1	1	15	02	8.94567	29
2	1	13	19	8.94531	28
3	1	11	30	8.94495	27
4	1	9	35	8.94459	26
5	1	7	36	8.94425	25
6	1	5	32	8.94391	24
7	1	3	24	8.94359	23
8	1	1	11	8.94328	22
9	0	58	54	8.94298	21
10	0	56	33	8.94269	20
11	0	54	08	8.24241	19
12	0	51	39	8.94214	18
13	0	49	07	8.94188	17
14	0	46	31	8.94164	16
15	0	43	53	8.94141	15
16	0	41	11	8.94119	14
17	0	38	26	8.94099	13
18	0	35	39	8.94080	12
19	0	32	49	8.94062	11
20	0	29	57	8.94046	10
21	0	27	04	8.94032	9
22	0	24	08	8.94019	8
23	0	21	10	8.94008	7
24	0	18	12	8.93997	6
25	0	15	12	8.93988	5
26	0	12	10	8.93981	4
27	0	9	09	8.93976	3
28	0	6	06	8.93972	2
29	0	2	03	8.93970	1
30	0	0	00	8.93970	0
	Sign 9			3 sub.	

A

A Table *of the Latitude of the Moon*, &c. *in the* Syzygia's.

Middle Diſtance of Sun from the Moon's Node.

Arg. Lat.	Sign 0 N. Sign 6 S. Latitude. ° ′ ″	*Inclinat. of the Way of the ☽ in Eclipſes.* ° ′ ″	*Reduc. Sub.* ′ ″	Arg. Lat.
0	0 00 00	5 17 20	0 0	30
1	0 05 14	5 17 17	0 14	29
2	0 10 28	5 17 08	0 29	28
3	0 15 42	5 16 54	0 43	27
4	0 20 56	5 16 33	0 58	26
5	0 26 09	5 16 07	1 12	25
6	0 31 21	5 15 35	1 26	24
7	0 36 33	5 14 56	1 41	23
8	0 41 45	5 14 13	1 55	22
9	0 46 52	5 13 23	2 9	21
10	0 52 05	5 12 28	2 22	20
11	0 57 14	5 11 27	2 36	19
12	1 02 22	5 10 20	2 49	18
13	1 07 28	5 09 07	3 2	17
14	1 12 34	5 07 49	3 15	16
15	1 17 38	5 06 25	3 28	15
16	1 22 41	5 04 55	3 40	14
17	1 27 42	5 03 20	3 53	13
18	1 32 42	5 01 39	4 4	12
19	1 37 40	4 59 53	4 16	11
20	1 42 36	4 58 00	4 27	10
21	1 47 31	4 56 03	4 38	9
22	1 52 24	4 54 00	4 49	8
23	1 57 15	4 51 51	4 59	7
24	2 02 03	4 49 37	5 9	6
25	2 06 48	4 47 18	5 19	5
26	2 11 33	4 44 54	5 28	4
27	2 16 14	4 42 24	5 37	3
28	2 20 52	4 39 49	5 45	2
29	2 35 29	4 37 09	5 53	1
30	2 30 03	4 34 24	6 0	0
	Sign 11 South / Sign 5 North	Deſcend.	Add	

A Table *of the Latitude of the Moon,* &c. *in the* Syzygias.

Middle Diſtance of the Sun from the Moon's Node.

Arg. Lat.	Sign 1 North / Sign 7 South Latitude. °	′	″	Reduc. Sub. I	II	Arg. Lat.
0	2	30	03	6	00	30
1	2	34	33	6	07	29
2	2	39	01	6	14	28
3	2	43	26	6	20	27
4	2	47	39	6	26	26
5	2	52	08	6	31	25
6	2	56	24	6	36	24
7	3	00	37	6	40	23
8	3	04	46	6	44	22
9	3	08	52	6	47	21
10	3	12	54	6	50	20
11	3	16	53	6	52	19
12	3	20	48	6	54	18
13	3	24	40	6	55	17
14	3	28	28	6	56	16
15	3	32	12	6	56	15
16	3	35	52	6	56	14
17	3	39	28	6	55	13
18	3	43	0	6	54	12
19	3	46	27	6	52	11
20	3	49	52	6	50	10
21	3	53	11	6	47	9
22	3	56	25	6	44	8
23	3	59	37	6	40	7
24	4	02	42	6	36	6
25	4	05	45	6	31	5
26	4	08	42	6	26	4
27	4	11	34	6	20	3
28	4	14	22	6	14	2
29	4	17	07	6	07	1
30	4	19	44	6	00	0
	Sign 10 South / Sign 4 North			Deſcend. add		

A Table of the Latitude of the Moon, &c. in the Syzygia's.

Middle Diſtance of Sun from the Moon's Node.

Arg. Lat.	Sign 2 N. Sign 8 S. Latitude. ° ′ ″	Reduc. ſub. ′ ″	Arg. Lat.
0	4 19 44	6 00	30
1	4 22 17	5 53	29
2	4 24 47	5 45	28
3	4 27 11	5 37	27
4	4 29 30	5 28	26
5	4 31 45	5 19	25
6	4 33 54	5 09	24
7	4 35 59	4 59	23
8	4 37 57	4 49	22
9	4 39 52	4 38	21
10	4 41 41	4 27	20
11	4 43 25	4 16	19
12	4 45 04	4 04	18
13	4 46 38	3 53	17
14	4 48 09	3 40	16
15	4 49 29	3 28	15
16	4 50 47	3 15	14
17	4 52 00	3 02	13
18	4 53 07	2 49	12
19	4 54 08	2 36	11
20	4 55 05	2 22	10
21	4 55 56	2 09	9
22	4 56 42	1 55	8
23	4 57 22	1 41	7
24	4 57 58	1 26	6
25	4 58 27	1 12	5
26	4 58 51	0 58	4
27	4 59 10	0 43	3
28	4 59 24	0 29	2
29	4 59 32	0 14	1
30	4 59 35	0 00	0
	Sign 10 South / Sign 4 North	Deſc. add.	

A Table *of the Hourly Motions, Semidiameters, and Horizontal Parallaxes of the Sun and Moon in Eclipſes.*

Mean Anom. ☉ *and* ☽. S.	°	*Tr. Hourly Motion of the* ☉ ′	″	*Semidiameter of the Sun.* ′	″	*Mean Anom.* ☉ *and* ☽. °	S.
0	0	2	23	15	49	0	12
	5	2	23	15	49	25	
	10	2	23	15	49	20	
	15	2	23	15	49	15	
	20	2	23	15	50	10	
	25	2	23	15	50	5	
1	0	2	24	15	51	0	11
	5	2	24	15	51	25	
	10	2	24	15	52	20	
	15	2	24	15	53	15	
	20	2	25	15	54	10	
	25	2	25	15	55	5	
2	0	2	25	15	56	0	10
	5	2	26	15	57	25	
	10	2	26	15	59	20	
	15	2	26	16	01	15	
	20	2	27	16	02	10	
	25	2	27	16	03	5	
3	0	2	28	16	05	0	9
	5	2	28	16	06	25	
	10	2	28	16	07	20	
	15	2	29	16	09	15	
	20	2	29	16	10	10	
	25	2	30	16	11	5	
4	0	2	30	16	13	0	8
	5	2	11	16	14	25	
	10	2	31	16	15	20	
	15	2	31	16	16	15	
	20	2	32	16	17	10	
	25	2	32	16	18	5	
5	0	2	32	16	19	0	7
	5	2	32	16	20	25	
	10	2	33	16	20	20	
	15	2	33	16	21	15	
	20	2	33	16	21	10	
	25	2	33	16	22	5	
6	0	2	33	16	22	0	6

A Table *of the Hourly Motions, Semidiameters, and Horizontal Parallaxes of the Sun and Moon in Eclipſes.*

Mean Anom. ☉ *and* ☽. S.	°	*Tr. Hourly Motion of the* ☽. ′	″	*Semidiameter of the Moon* ′	″	*Horiz. Parallax of* ☽. °	″	*Mean Anom.* ☉ *and* ☽. °	S.
0	0	29	33	14	42	53	28	0	12
	5	29	34	14	42	53	29	25	
	10	29	36	14	43	53	31	20	
	15	29	39	14	44	53	35	15	
	20	29	45	14	45	53	41	10	
	25	29	53	14	47	73	48	5	
1	0	30	01	14	50	53	57	0	11
	5	30	11	14	53	54	07	25	
	10	30	22	14	55	54	18	20	
	15	30	36	14	59	54	32	15	
	20	30	50	15	02	54	45	10	
	25	31	06	15	07	55	06	5	
2	0	31	23	15	11	55	16	0	10
	5	31	42	15	16	55	33	25	
	10	32	01	15	21	55	51	20	
	15	32	23	15	26	56	10	15	
	20	32	45	15	31	56	30	10	
	25	33	08	15	37	56	49	5	
3	0	33	32	15	42	57	09	0	9
	5	33	56	15	48	57	29	25	
	10	34	21	15	53	58	49	20	
	15	34	45	15	59	58	09	15	
	20	35	08	16	04	58	28	10	
	25	35	31	16	10	59	47	5	
4	0	35	54	16	15	59	05	0	8
	5	36	14	16	19	59	23	25	
	10	36	34	16	24	59	40	20	
	15	36	53	16	28	59	55	15	
	20	37	10	16	32	60	10	10	
	25	37	24	16	36	60	23	5	
5	0	37	39	16	39	60	34	0	7
	5	37	50	16	42	60	44	25	
	10	38	00	16	44	60	52	20	
	15	38	06	16	45	60	58	15	
	20	38	14	16	47	61	03	10	
	25	38	17	16	48	61	06	5	
6		38	18	16	48	61	07	0	6

A Table *of the Moon's Ecliptic Equation and Logarithm of her Diſtance from the Earth, to ſupply the Place of that in my* Syſtem, Pages 51, 52, 53.

Anom.	Sign 0 ſub. Equation. ° ′ ″	Logar.	Anom.
0	0 00 00	5.029668	30
1	0 05 00	5.029664	29
2	0 09 58	5.029653	28
3	0 14 56	5.029633	27
4	0 19 54	5.029606	26
5	0 24 54	5.029571	25
6	0 29 52	5.029528	24
7	0 34 48	5.029477	23
8	0 39 46	5.029419	22
9	0 44 44	5.029353	21
10	0 49 36	5.029274	20
11	0 54 32	5.029197	19
12	0 59 22	5.029108	18
13	1 04 14	5.029012	17
14	1 09 10	5.028907	16
15	1 14 00	5.028794	15
16	1 18 48	5.028674	14
17	1 23 38	5.028547	13
18	1 28 24	5.028411	12
19	1 33 10	5.028268	11
20	1 37 54	5.028118	10
21	1 42 32	5.027960	9
22	1 47 16	5.027794	8
23	1 51 54	5.027621	7
24	1 56 32	5.027440	6
25	2 01 08	5.027252	5
26	2 05 40	5.027057	4
27	2 10 12	5.026854	3
28	2 14 40	5.026643	2
29	2 19 08	5.026425	1
30	2 23 32	5.026200	0
	Sign 11	add	

The

The Table of the Moon's Ecliptic Equation and Logarithm continued.

Anom.	Sign 1 sub. Equation. ° ′ ″	Logar.	Anom.
0	2 23 32	5.026200	30
1	2 27 54	5.025968	29
2	2 32 14	5.025728	28
3	2 36 32	5.035482	27
4	2 40 44	5.025228	26
5	2 45 00	5.024967	25
6	2 49 08	5.024699	24
7	2 53 14	5.024424	23
8	2 57 16	5.024142	22
9	3 1 18	5.023853	21
10	3 5 18	5.023557	20
11	3 9 10	5.023254	19
12	3 13 02	5.022944	18
13	3 16 52	5.022628	17
14	3 20 36	5.022304	16
15	3 24 18	5.021974	15
16	3 27 56	5.021638	14
17	3 31 32	5.021294	13
18	3 35 02	5.020945	12
19	3 38 32	5.020590	11
20	3 41 54	5.020228	10
21	3 45 16	5.019860	9
22	3 48 31	5.019485	8
23	3 51 46	5.019105	7
24	3 54 54	5.018718	6
25	4 58 00	5.018326	5
26	3 1 00	5.017928	4
27	4 3 58	5.017523	3
28	4 6 50	5.017113	2
29	4 9 38	5.016698	1
30	4 12 20	5.016277	0
	Sign 10	add	

A Table of the Moon's Elliptic Equation and Logarithm of her Distance from the Earth, continued.

Anom.	Sign 2 sub. Equation ° ′ ″	Logar.	Anom.
0	4 12 26	5.016477	30
1	4 15 04	5.015891	29
2	4 17 36	5.015479	28
3	4 20 10	5.014982	27
4	4 22 36	5.014540	26
5	4 24 58	5.014093	25
6	4 27 14	5.013640	24
7	4 29 30	5.013183	23
8	4 31 36	5.012712	22
9	4 33 42	5.012255	21
10	4 35 38	5.011784	20
11	4 37 34	5.011309	19
12	4 39 22	5.010838	18
13	4 41 08	5.010346	17
14	4 42 46	5.009858	16
15	4 44 20	5.009367	15
16	4 45 50	5.008871	14
17	4 47 16	5.008371	13
18	4 48 34	5.007869	12
19	4 49 50	5.007363	11
20	4 50 58	5.006853	10
21	4 52 04	5.006341	9
22	4 53 00	5.005826	8
23	4 53 56	5.005307	7
24	4 54 42	5.004786	6
25	4 55 26	5.004262	5
26	4 56 02	5.003736	4
27	4 56 36	5.003207	3
28	4 57 02	5.002677	2
29	4 57 34	5.002144	1
30	4 57 40	5.001610	0
	Sign 9 add		

The Table *of the Moon's Elliptic Equation, with the Logarithm of her Diſtance from the Earth, continued.*

Anom.	Signs 3 ſub. Equation. ° ' "	Logarithm.	Anom.
0	4 57 40	5.001610	30
1	4 57 52	5.001074	29
2	4 57 54	5.000537	28
3	4 57 56	4.999998	27
4	4 57 50	4.999458	26
5	4 57 42	4.998917	25
6	4 57 24	4.998375	24
7	4 57 02	4.997832	23
8	4 56 34	4.997290	22
9	4 56 02	4.996747	21
10	4 55 22	4.996203	20
11	4 54 40	4.995659	19
12	4 53 48	4.995117	18
13	4 52 54	4.993575	17
14	4 51 52	4.994033	16
15	4 50 48	4.993492	15
16	4 49 36	4.992952	14
17	4 48 20	4.992412	13
18	4 46 56	4.991874	12
19	4 45 30	4.991337	11
20	4 43 56	4.990803	10
21	4 42 18	4.990270	9
22	4 40 34	4.989739	8
23	4 38 46	4.989211	7
24	4 36 48	4.988685	6
25	4 34 56	4.988162	5
26	4 32 44	4.987641	4
27	4 30 36	4.987124	3
28	4 28 18	4.986610	2
29	4 25 58	4.986099	1
30	4 23 30	4.985591	0
	Signs 8	add.	

T Table *of the Moon's Elliptic Equation, with the Logarithm of her Diſtance from the Earth, continued.*

Anom.	Sign 4 ſub. Equation. °	′	″	Logar.	Anom.
0	4	23	30	4.955591	30
1	4	21	02	4.985088	29
2	4	18	24	4.984588	28
3	4	15	44	4.984093	27
4	4	12	56	4.983602	26
5	4	10	08	4.983116	25
6	4	07	10	4.982634	24
7	4	04	10	4.982158	23
8	4	01	02	4.981686	22
9	3	57	54	4.981220	21
10	3	54	36	4.980759	20
11	3	51	18	4.980304	19
12	3	47	52	4.979856	18
13	3	44	24	4.979412	17
14	3	40	50	4.978975	16
15	3	37	14	4.978545	15
16	3	33	28	4.978120	14
17	3	29	44	4.977703	13
18	3	25	52	4.977293	12
19	3	21	58	4.976890	11
20	3	17	58	4.976494	10
21	3	13	56	4.976106	9
22	3	09	48	4.975724	8
23	3	05	38	4.975351	7
24	3	01	24	4.974929	6
25	2	57	06	4.974629	5
26	2	52	44	4.974280	4
25	2	48	18	4.973939	3
28	2	43	50	4.973607	2
29	2	39	17	4.973284	1
30	2	34	42	4.972970	0
	Sign 7			add.	

The Table *of the Moon's Elliptic Equation, with the Logarithm of her Diſtance from the Earth, continued.*

Anom.	Sign 5 ſub. Equation.			Logar	Anom.
0	2	34	42	4.972970	30
1	2	30	06	4.972665	29
2	2	25	22	4.972368	28
3	2	20	38	4.972081	27
4	2	15	50	4.971802	26
5	2	11	02	4.971534	25
6	2	06	08	4.971274	24
7	2	01	14	4.971025	23
8	1	56	14	4.970785	22
9	1	51	14	4.970555	21
10	1	46	12	4.970335	20
11	1	41	08	4.970126	19
12	1	36	00	4.969927	18
13	1	30	52	4.969738	17
14	1	25	40	4.969559	16
15	1	20	28	4.969391	15
16	1	15	14	4.969232	14
17	1	09	58	4.969085	13
18	1	04	40	4.968944	12
19	0	59	22	4.968822	11
20	0	54	02	4.968706	10
21	0	48	42	4.968602	9
22	0	43	20	4.968509	8
23	0	37	56	4.968427	7
24	0	32	32	4.968355	6
25	0	27	08	4.968294	5
26	0	21	44	4.968244	4
27	0	16	18	4.968206	3
28	0	10	52	4.968179	2
29	0	05	26	4.968162	1
30	0	00	00	4.968156	0
	Sign 6 add.				

A Table of the Curtation of ♀, ♂, ♃, ♄, to be uſed with my Syſtem.

Arg. Lat.	Curtation of *Venus*.			Arg. Lat.
	Signs 0 / 6	Signs 1 / 7	Signs 2 / 8	
0	0	190	570	30
1	0	201	581	29
2	1	213	592	28
3	2	225	601	27
4	4	237	614	26
5	6	250	624	25
6	8	262	634	24
7	11	275	644	23
8	15	288	653	22
9	19	301	662	21
10	23	314	671	20
11	28	327	679	19
12	33	340	687	18
13	38	353	695	17
14	44	366	702	16
15	51	380	709	15
16	58	393	716	14
17	65	406	721	13
18	72	420	727	12
19	80	433	732	11
20	89	446	737	10
21	97	459	741	9
22	106	472	745	8
23	116	485	749	7
24	125	497	752	6
25	135	510	754	5
26	146	522	756	4
27	156	534	758	3
28	167	548	759	2
29	178	558	760	1
30	190	570	760	0
	Signs 11 5	10 4	9 3	

The Table *of the Curtation of* ♀, ♂, ♃, *and* ♄, *to be uſed with my* Syſtem.

Arg. Lat.	Curtation of *Mars.* Signs 0 / 6	Signs 1 / 7	Signs 2 / 8	Arg. Lat.
0	0	56	170	30
1	0	60	173	29
2	0	64	176	28
3	1	67	180	27
4	1	71	183	26
5	2	74	186	25
6	2	78	189	24
7	3	82	192	23
8	4	86	195	22
9	5	90	197	21
10	7	93	200	20
11	8	97	262	19
12	10	101	205	18
13	11	105	207	17
14	13	109	209	16
15	15	113	211	15
16	17	117	213	14
17	19	121	215	13
18	22	125	217	12
19	24	129	218	11
20	27	133	220	10
21	29	137	221	9
22	32	141	222	8
23	34	144	223	7
24	37	148	224	6
25	40	152	225	5
26	43	155	125	4
27	47	159	226	3
28	50	163	226	2
29	53	166	226	1
30	56	170	226	0
	Signs 5	10 / 14	9 / 3	

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The Table *of the Curtation of* ♀, ♂, ♃, *and* ♄, *continued.*

Arg. Lat.	Curtation of *Jupiter.*			Arg. Lat.
	Signs	Signs	Signs	
	0	1	2	
	6	7	8	
0	0	29	86	30
1	0	30	88	29
2	0	32	90	28
3	0	34	91	27
4	0	36	93	26
5	1	38	94	25
6	1	40	96	24
7	2	42	97	23
8	2	44	99	22
9	3	46	100	21
10	3	48	102	20
11	4	50	103	19
12	5	52	104	18
13	6	53	105	17
14	7	55	106	16
15	8	57	107	15
16	9	59	108	14
17	10	61	109	13
18	11	64	110	12
19	12	66	111	11
20	13	68	112	10
21	15	69	113	9
22	16	71	113	8
23	18	73	114	7
24	19	75	114	6
25	20	77	114	5
26	22	79	114	4
27	24	81	115	3
28	25	83	115	2
29	27	85	115	1
30	29	86	115	0
	11	10	9	
	5	4	3	

The Table *of the Curtation of* ♀, ♂, ♃, *and* ♄, *continued.*

Arg. Lat.	Curtation of *Saturn.* Signs 0 / 6	Signs 1 / 7	Signs 2 / 8	Arg. Lat.
0	0	103	307	30
1	0	110	316	29
2	1	116	322	28
3	1	123	328	27
4	2	129	334	26
5	3	136	340	25
6	4	143	345	24
7	6	150	350	23
8	8	157	355	22
9	10	164	360	21
10	12	171	365	20
11	15	178	370	19
12	18	185	374	18
13	21	192	378	17
14	24	200	382	16
15	28	207	386	15
16	32	214	389	14
17	36	221	393	13
18	40	228	396	12
19	44	236	399	11
20	48	243	401	10
21	53	250	403	9
22	58	257	406	8
23	63	264	408	7
24	68	271	410	6
25	74	277	411	5
26	79	284	412	4
27	85	291	413	3
28	91	297	414	2
29	97	303	414	1
30	103	307	414	0
31	Signs 11 5	Sig. 10 4	Signs 9 5	

A Table of the Inclination, Reduction and Curtation of ☿.

Arg. Lat.	Sign ☌ N. A. Sign ☍ S. A. Inclination. °	′	″	Reduc. Sub. °	″	Curt sub.	Arg. Lat.
0	0	00	00	0	00	0	30
1	0	07	18	0	27	1	29
2	0	14	36	0	53	4	28
3	0	21	54	1	20	9	27
4	0	29	11	1	47	16	26
5	0	36	37	2	13	24	25
6	0	43	43	2	39	35	24
7	0	50	59	3	05	48	23
8	0	58	13	3	31	62	22
9	1	05	26	3	57	79	21
10	1	12	38	4	42	97	20
11	1	19	49	4	47	117	19
12	1	26	58	5	12	139	18
13	1	34	06	5	36	163	17
14	1	41	12	6	00	188	16
15	1	48	17	6	23	215	15
16	1	55	19	6	46	244	14
17	2	02	19	7	09	275	13
18	2	09	17	7	31	307	12
19	2	16	13	7	52	341	11
20	2	23	06	8	13	376	10
21	2	29	57	8	33	413	9
22	2	36	45	8	53	452	8
23	2	43	30	9	12	491	7
24	2	50	12	9	30	532	6
25	2	56	51	9	48	575	5
26	3	03	27	10	05	619	4
27	3	10	00	10	21	664	3
28	3	16	29	10	36	710	2
29	3	22	55	10	51	757	1
30	3	29	17	11	05	805	0
	Sign 11 S. D. 5 N. D.			Add.		Sub.	

The

CHAP. X.

To find the true Hour of the Night by the Fixed Stars.

FOR this purpose you must be provided with a good Quadrant that will take the Stars Altitudes to Minutes (or, if possible, to 15″;) and because the Latitude of the Place of Observation must always be known, before you can find the Hour of the Night; it may be done by Sect. II. of my *Satellite-Astronomy*; which Figure I shall here make use of, in an Example of the Latitude taken by the Altitude of two known Stars, in order to find also the true Hour of the Night.

Example. Admit, *Jan.* 2, 1734, being in a certain Place, I observe the Altitude of *Capella* to be 71° 30′ short of the Meridian, and of the Head of *Andromeda* 45°. I demand the Latitude of the Place, and true Hour of the Night?

In my *System*, Page 228, I find the Longitude of *Capella* to be ♊ 18° 8′, Latitude 22° 52′ North. From whence its Declination is 45° 42′ North, and its Right Ascension 74° 15′; The Longitude of *Andromeda*'s Head, ♈ 10° 36′, and Latitude 25° 41′ North, and consequently its Declination 27° 37′ North, and Right Ascension 358° 40′.

Now, for the Latitude of the Place of Observation.

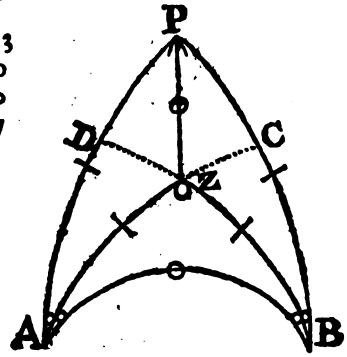
OPERATION.

	°	′	
From R A of *Capella*	74	15	+ 360°
Sub. R A of *Andromeda*	358	40	
Rem. ∠ A P B	75	35	

First,

First, In the Triangle *APB*, for the Side *AB*.

As *c.s. PB*	62 23	6.718633
To Radius	90 00	10.000000
So *SC. ∠APB*	75 35	9.396150
To *s. DP*	25 27	9.677517
From *AP*	44 18	
Rem. *AD*	18 51	



As *C.S. DP*	25 27	Co. Ar.	0.044331
To *C.S. AD*	18 51		9.976060
So *C.S. BP*	62 23		9.666100
To *C.S. AB*	60 56		9.686491

Secondly, For the Angle *ABP*.

As S. *AB*	60 56	Co. Ar.	0.058461
To S. *∠ APB*	75 35		9.986124
So S. *AP*	44 18		9.844114
To S. *∠ ABP*	50 42		9.888699

Thirdly, For the Angle BAP.

As S. *AB*	60 56	Co. Ar.	0.058461
To S. *∠ APB*	75 35		9.986124
So S. *PB*	62 23		9.947465
To S. *∠ BAP*	79 4		9.992050

Fourthly,

Fourthly, For the Angle Z A B.

		°	′
Sides	AB	60	56
	AZ	18	30
	ZB	44	00
Z =		123	26
Half		61	43
AB —		60	56
X =		0	47

		°	′
Half		61	43
AZ —		18	30
X =		43	13

	° ′		
S. A B.	60 56	Co. Ar.	0.058461
S. A Z.	18 30	Co. Ar.	0.498524
S. X.	43 13		9.835538
S. X.	00 47		8.135810
Sum Logarithms			18.528333
Half is the Sine	10° 35′		9.264166
Double ſub.	21 10 = ∠ Z A B.		

		°	′
From the ∠ BAP		79	4
Rem. the ∠ ZAP		57	54

Fifthly, For the Angle Z B A.

		°	′
Sides	AB	60	56
	ZB	44	00
	AZ	18	30
Z =		123	26
Half		61	43
A B		60	56
X =		00	47

		°	′
		61	43
Z B		44	00
X		17	43

S. AB

	°	′		
S. AB	60	56	Co. Ar.	0.058461
S. ZB	44	00	Co. Ar.	0.158229
S. X	17	43		9.483316
S. X	0	47		8.135810
Sum Logarithms				17.835816
½ Sine is	4	45		8.917908
Double is	9	30	= ∠ ZBA.	
From ABP	50	42		
Rem.	41	12	= ∠ PBZ.	

6. For the Side ZP, the Complement of the Latitude,

In the Oblique-angled Spheric Triangle PZB, there are known ZB, the Complement of the Altitude of the Head of *Andromeda* 44°, PB the Complement of the ſame Star's Declination 61° 23′, and the Angle ZPB 41° 12′ (found in the laſt Operation) to find the Side ZP, the Complement of the Latitude of the Place.

See the Work.

	°	′		
As *C.t.* Z B —	44	00		10.015162
To Radius	90	00		10.000000
So *S.C.* ∠ ZBP	41	12		9 976457
To *t.* B C ſub.	36	00		9.861295
From B P	62	23		
Remains C P	26	23		
As *C.S.* BC	36	00	Co. Ar.	0.092042
To *C S.* CP	26	23		9.952231
So *C.S.* ZB	44	00		9.856934
To *C S.* ZP	37	12		9.901207
From	90	00		
Rem. Latitude	52	48	North.	

The

The Angles at the Zenith are,

		°	′	
Angle	A Z B	152	59	
	P Z B	105	08	
	P Z A	101	53	
	Z	360	00	Proof.

Secondly, For the true Hour of the Night.

The Right Aſcenſion of the Sun is increaſed daily about 4 Minutes in Time; ſo that if your Meridian differ from that of *London* 6 Hours in Time, then the Right Aſcenſion will differ one Minute. If the Difference of the Meridians be 12 Hours, the Sun's Right Aſcenſion will differ 2 Minutes; if the Meridian differ 18 Hours from *London*, the Sun's Right Aſcenſion will differ 3 Minutes; and ſo one Revolution round the Globe is equal to the Sun's Diurnal Motion near one Degree, which is equal to 4 Minutes in Time, performed in near 24 Hours.

If your Place lie to the Eaſt of *London*, the Sun's Right Aſcenſion, proportioned as above, muſt be ſubtracted from the Sun's Right Aſcenſion at *London* at the ſame Hour: But if you are to the Weſt of *London*, the Minutes of the Sun's Right Aſcenſion muſt be added to the Sun's Right Aſcenſion at *London* at the ſame Hour.

As for inſtance; ſuppoſe *January* 2, at Noon, under the Meridian of *London* the Sun's Right Aſcenſion be 19 Hours 41 Minutes; what is the Sun's Right Aſcenſion at Fort St. *George* in the *Eaſt Indies*, and *Port Royal* in *Jamaica* at Noon?

Hence, becauſe the firſt Place lies 5 Hours, 24 Minutes to the Eaſt, and the latter lies 5 Hours, 4 Minutes to the Weſt of *London*, therefore I ſubtract for the firſt Place 1 Minute, and for the ſecond add 1 Minute to and from the Sun's Right Aſcenſion at *London* that Day at Noon, and I have the Sun's Right Aſcenſion at thoſe Places ſeverally the ſame Day at Noon, as follows.

Jan. 2.

		h.	′
Jan. 2. at Noon Sun's	Fort St. *George*	19	40
Right Aſcenſion at	*Port Royal*	19	42

The like is to be obſerved at any other Time and Place.

2. The Right Aſcenſion of the Fixed Stars alter but little for ſeveral Years: Therefore as you find them in my *Syſtem*, &c. ſo may you uſe them without any ſenſible Error, for this Age.

For as the Difference of Meridian Altitudes of any two *Stars* gives the Difference of their Declination; ſo the difference of the time of their Tranſits over the Meridian is the difference of their Right Aſcenſions; and by having the Latitude of the Place, and the Meridian Altitude of any *Star*, you have alſo its Declination given, and *vice verſa*.

Here you muſt alſo note, that all the Heavenly Bodies have the ſame Altitude that they have at *London*, if you are in the ſame Parallel, altho' diſtant 180° Eaſt or Weſt, at the ſame Hour of the Day or Night.

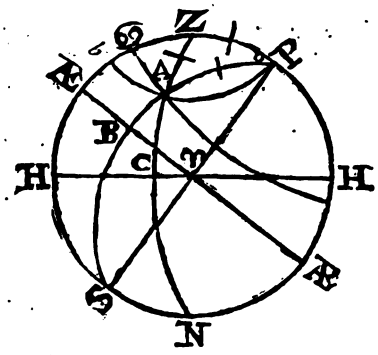
As, for inſtance; ſuppoſe you obſerve *Arcturus* to have 30° of Altitude at 9 a-Clock at Night at *London*: I ſay, he has the ſame Altitude at 9 at Night in the Latitude of *London*, altho' the Place be Eaſt or Weſt 90 Degrees, more or leſs from *London*: and this Property belongs to all the Heavenly Bodies.

What I have ſaid upon this Head, generally belongs to Seamen and Travellers: But to thoſe that live any where in *England*, the Meridian-Diſtance is but little from *London* Eaſt or Weſt; there needs not any ſuch allowance for the Sun's Right Aſcenſion to be made.

Now, in order to find the true Hour of the Night, you muſt firſt find the time of the *Star*'s ſouthing; which is done, by ſubtracting the *Sun*'s Right Aſcenſion from the *Star*'s, borrowing 24 Hours, if need require; and then, having taken the *Star*'s Altitude, and from it ſubtracted the Refraction anſwering, you muſt project the Oblique-angled Spheric Triangle, in which there are given AZ, the Complement of the *Star*'s Altitude, AP, the Complement of the *Star*'s Declination, and ZP, the Complement of the Latitude of the Place, to find the Angle at the Pole, which is the time between the *Star*'s ſouthing, and the time you are ſeeking; which, if the *Star* be ſhort of the Meridian, muſt be ſubtra-

ded from the time of ſouthing; but if the *Star* be paſt the Meridian, the Angle at the Pole muſt be added to the time of the *Star*'s ſouthing; the Sum, or Difference is the true Hour of the Night.

Example. Admit, *Jan.* 2, 1734, in the Latitude of 52° 48′, the Altitude of the Head of *Andromeda* was obſerved 46 Degrees paſt the Meridian. I demand the true Hour of the Night?



OPERATION.

	h.	′
Right Aſcenſion of the Star,	23	55
Right Aſcenſion of the Sun,	19	40
Remains the time of Southing,	4	15

Now for the Angle ZPA.

		°	′		°	′
Sides	AP	62	23			
	AZ	44	00			
	ZP	37	12			
Z =		143	35	—		
Half =		71	47		71	47
AP =		62	23	ZP =	37	12
X =		9	24	X =	34	35

SAP

	°	′		
SAP	62	23	Co Ar.	0.052533
SZP	37	12	Co Ar.	0,218533
SX	24	35		9.754046
SX	9	24		9.213055
Z Logarithms — —				19.238167
Half Z=S: 24	35	—		9.619083

				h.	″	″
Double	49	10	= ∠ ZPA =	3	12	40
Time of ſouthing add				4	15	00
True Hour of the Night				7	27	40

Example 2. Admit at *London*, *Jan.* 18, I obſerve the Altitude of *Pollux* to be 50° ſhort of the Meridian. I demand the true Hour of the Night?

The above-mentioned Scheme may ſerve our turns well enough for this purpoſe. In which, let AZ be the Complement of the Star's Altitude 40°, AP the Complement of its Declination, 61° 21′, ZP the Complement of the Latitude of *London*, the Place of Obſervation 38° 28′, to find the Angle at the Pole?

Firſt, For the time of Southing.

	h.	′
Right Aſcenſion of the Star,	7	28
Right Aſcenſion of the Sun ſub.	20	47
Time of Southing — —	10	41

For the ∠ at the Pole.

		°	′
Sides	AP	61	21
	AZ	40	00
	ZP	38	28
	Z ⌣	139	49
	Half	69	54
	AP =	61	21
	X =	8	33

				°	′
				69	54
ZP =				38	28
X =				31	26

S. AP	61	21	Co Ar.	0.056721
S. ZP	38	21	Co. Ar.	0.206168
S. X	31	26		9.717259
S. X	8	33		9.172230
Z Logarithms				19.152378
Half S.	22	08		9.576189

	h.	′	″	
Doubled 44 16 = ∠ ZPA =	2	57	4	ſubtract.
From the time of Southing	10	41	0	
True time of the Night	7	43	56	

Thus you ſee, how readily and exactly may the Hour of the Night be found at any Time and Place, when the Stars are ſeen; or by the Moon and other Planets: But then it will require more Labour, becauſe of their ſwift Motion in Longitude. But when their true Declinations and Right Aſcenſions are found, the Work is the ſame, (except the Moon) in finding the ∠ at the Pole, the time of Southing, and from thence, the true Hour of the Night.

And now I am upon Explaining how to find out true Time, it will not be amiſs to ſay a Word or two to thoſe whoſe Buſineſs it is to look after Time-keepers, as Clock and Watch-makers, every one of which generally has a Movement, which they call a *Regulator*. This is their Standard, by which they ſet Gentlemens Watches. I am very ſenſible there are not Two of theſe Regulators in *London* the ſame Time; yet they all tell you they are right, and that each his Machine keeps Time to a Miracle. But alas! when I come to enquire into the Foundation of their Time,

by

by what they have ſet their Regulator, one ſays, he ſet his by St. *Paul*'s Clock, another by the Royal Exchange-Clock, another by the Dial in *Gray*'s Inn Walks, another by *Covent-Garden* Dial, on a Day when there was no Equation; another ſets his by the *Temple*-Dial; and poſſibly, another by ſome Dial on an Houſe-ſide. Indeed, a Dial well made, and truly ſet, will keep apparent Time true enough; but I know not one, altho' he can make the Dial ever ſo well, that can ſet it true when he has done; ſo that if the Dial be ever ſo truly made, if it is not truly ſet, it will give you wrong Time; and conſequently, all Movements ſet by ſuch Dials muſt of neceſſity err, altho' the Movement will keep good Time to what it was ſet; yet becauſe it was ſet upon a wrong Baſis, the Time ſhewn by it is falſe, as I have daily proved.

Now to put them all to rights, they muſt learn ſo much of Aſtronomy, as will inform them of this matter, my *Syſtem*, Vol. I. Prob. 17. and this Book will give any one ample ſatisfaction.

Now, to make this intelligible to the meaneſt Capacity, thoſe that are minded to be Maſters hereof, muſt be provided with a good *Aſtronomical Quadrant*, as mentioned at the beginning of this Chapter, and is hereafter more largely deſcribed; and then, by the Latitude of the Place, and Altitude of the Sun or Star, the true Hour of the Day or Night may be found, which is the apparent Time; and becauſe good Clocks and Watches keep equal Time, whatever the Equation of Time is, ſet your Regulator accordingly.

Then on any of Days when the Equation vaniſhes, make Obſervation, and ſee if your Regulator and the Sun be together; if they are, then is the Regulator right; elſe not.

Make Obſervation on the Day when the Equation is the greateſt; as, ſuppoſe at the latter End of *January*, if then the Regulator be 14 Minutes, 41 Seconds too faſt for the Time obſerved, then is your Regulator right, elſe not.

And thus may you prove it any Day or Night at pleaſure, and keep it to that juſt Time, that it may be a perfect true Regulator.

There is but one thing more which I have to remind my Reader of in this Affair; which is, if he ſets his Regulator by a Sun-Dial, it ought not to be done early in the Morning, or late in the Afternoon: For then the Shadow on the Dial is not the true Hour of the Day, in regard the Sun hath then conſiderable Refraction, which makes the Sun appear higher than really he is; and the nearer the Horizon, the greater is this Error of Time ſhewn by the Dial; ſo that all Sun-Dials go too faſt in the Forenoon, and too ſlow in the Afternoon, be they ever ſo well made and truly ſet.

Therefore if you are ſure of ſuch a Dial's Truth, then if it is an Horizontal or South Erect-Direct Dial, ſet your Regulators as near Noon as poſſible: For the Refraction is the leaſt, and conſequently the Time is then the trueſt.

But if you are to obſerve the Time by the Direction above-given, let the *Sun* or *Star* (if poſſible) be an Hour and half, or two Hours from the Meridian; for the Altitude from Ten in the Morning, till Two in the Afternoon alters but little, *viz.* in a *Ratio* proportional to the Natural Sines.

CHAP.

CHAP. XI.

How to observe the Sun's true Place, other Ways than is shewn in the 41ſt *Problem of my* Syſtem.

IN the 5*th* Page of this Book I have told you, that theſe Obſervations were taken with a new-invented Quadrant anſwering to a Radius of 270 Feet. Which Quadrant is made by Mr. *John Barſton* of *Chelſea*, Watch-maker (where any Gentlemen may have them, either with, or without Seconds) and has been try'd by ſeveral able Aſtronomers and Navigators, being found to anſwer moſt exactly its intended Ends, and to excel all others in theſe following Particulars, *viz.*

1. It requires no Shade from the Sun:

2. Nor any viſible Horizon.

3. 'Tis not ſo liable to be affected by the Motion of the Ship.

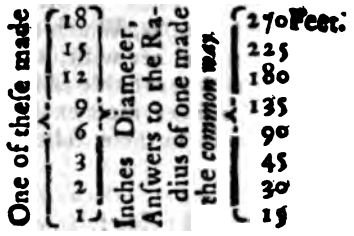
4. An Obſervation may be taken with it in the Night (of which there are more frequent Opportunities than in the Day) either of the Moon or Fixed Stars, and the Latitude be thereby exactly determined.

5. In this Inſtrument there is nothing required, but that you ſee the Object, *viz.* Sun, Moon or Star: Whereas in all the Inſtruments now uſed, there are more things than one required, to be ſeen at the time of taking the Obſervation; beſides the Difficulty of moving the ſliding Pieces with the Finger, which, while the Obſervator is doing, the Opportunity of taking the Obſervation is many times loſt.

6. It divides a Degree into 60 equal Parts, and thereby the Altitude is determin'd to a Minute, and conſequently the Latitude of the Place to a Mile at Sea.

That it does really excel all others in the foreſaid Particulars, has never been queſtioned by any who has ſeen it, and is an experienc'd Navigator: And it has been affirmed by ſeveral, that had there been ſuch an Inſtrument in uſe in the time of Sir *Cloudeſly Shovell*, the Loſs of that Honourable Gentleman, and of all thoſe unfortunate Perſons who were with him, had been prevented.

Therefore I recommend it to all Aſtronomers and Navigators, as the moſt uſeful Inſtrument that was ever yet made.



Given, the Latitude of the Place, the Hour of the Day, and the Sun's true Altitude; to find the Sun's true Place in the Ecliptic?

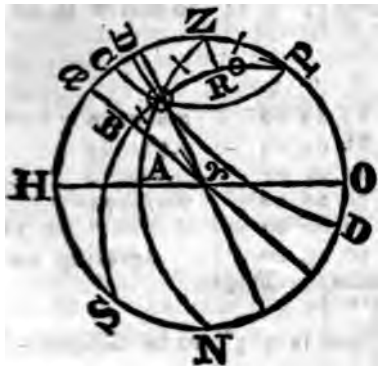
Example. At *London*, ♀ *May* 21, 1731, at 2 Hours P. M. Apparent Time, I obſerved, the Sun's apparent Altitude 52 Degrees, 13 Minutes, 15 Seconds. I demand the Sun's true Place?

OPERATION.

	°	′	″
Apparent Altitude	52	30	15
Refraction ſub.			41
True Altitude	52	29	34

Pro-

Projection. Draw the Primitive Circle ZHO, quarter it, and draw HO for the Horizon; ſet off the Latitude 51° 32′ from O to P, and from Z to ♎ draw ♎ ♈ for the Equinoctial; with the Secant of 30° (the time from Noon) draw PBS; and with the Co-Tangent of the Altitude 37° 30′ 26″ draw the Parallel of Altitude C⊙P; where this cuts the Meridian P⊙S, which is at ⊙, draw the Azimuth Z⊙N; and laſtly, draw ⊙ ♈ for the Ecliptic, and C⊙D for the Parallel of the *Sun*'s Declination.



And now there are given (1.) ZP the Complement of the Latitude 38° 28′. (2.) Z⊙ the Complement of the *Sun*'s Altitude 37° 30′ 26″, with the time from Noon = ∠ ⊙PZ 30°, to find the Side ⊙P the Complement of the *Sun*'s true Declination. Let fall the Perpendicular ZR, and then ſay,

		°	′	″	
As C.t.	—	38	28	00	10.099913
To Radius		90	00	00	10.000000
So C.S. ∠ P		30	00	00	9.937531
To *t.* RP		34	31	47	9.837618
As C.S. ZP		38	28	00	Co Ar. 0.106255
To C.S. Z⊙		37	30	26	9.899425
So C.S. RP		34	31	47	9.915139
To C.S. ⊙R		33	24	59	9.921819
Z Sub.		67	56	46	
From		90	00	00	
Sun's true Decl. = ⊙		22	3	14	North.

New

Now in the Rectangled Triangle ♈B☉ are known the Angle B ♈ ☉ 23° 29', and B☉ 22° 3' 14", to find ♈ ☉, the Sun's true Longitude?

	° ' "	
As S. ∠ B ♈ ☉	23 29 00	9.600409
To S B☉	22 03 14	9.574583
So Radius	90 00 00	10.000000
To S ♈ ☉	70 26 10	9.974174
Sub. 2 Signs = ♊	60 00 00	
Sun in ♊	10 26 10	Agreeing exactly with the Calculation from my Tables.

Note, The Equation of Time is 3' 3", to be subtracted from apparent Time.

When the Sun is more than 45 Degrees from the Equinoctial Points, the Sines encreaſe ſo very ſlow, that a few Seconds in the Declination make a conſiderable Alteration in the Sun's Place; ſo that it requires exquiſite Inſtruments to make the Obſervations withal.

CHAP.

CHAP. XII.

How to find the Moon's true Place by Obſervation.

GIVEN the Latitude of the Place, the Hour of Obſervation, with the Moon's obſerv'd Altitude, and the Place of the Nodes, to find her true Place?

Example. *Anno* 1731, *May* 7, at 10, at Night, I obſerv'd the Moon's Latitude at *London* to be 23° 59′ 10″; what is her true Place?

The true Place of her North Node was then ♑ 8° 48′ 57″.

Before I proceed to the Solution of this Problem, I ſhall explain two uſeful Caſes in Sphericks, which are theſe:

1. Given two Sides, with the Angles oppoſite to them, to find the third Side.

RULE.

As the Sine of half the Difference of the given Angles,
To the Sine of half the Sum of thoſe Angles;
So is the Tangent of half the Difference of the given Sides,
To the Tangent of half the Side required.

2. Given two Angles, and the Sides oppoſite to them to find the other Angle.

RULE.

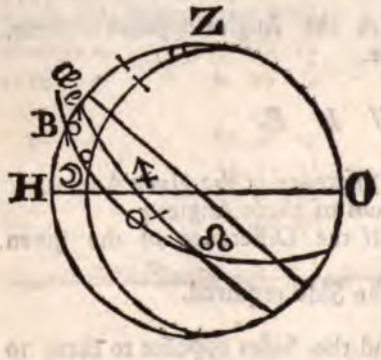
As the Sine of half the Difference of the given Sides,
To the Sine of half the Sum of thoſe Sides;
So is the Tangent of half the Difference of the given ∠;
To the Co-Tangent of half the ∠ required.

And

And the three ſides of any Spheric Triangle are leſs than a Circle, or 360°: Alſo the three Angles taken together, are greater than two Right, or 180°.

Now, to proceed to the Solution of the Problem for the Moon's Place, thus:

	D.	h.	′	″
Anno 1731,	7	10	00	00
Equat. of Time add	0	00	04	01
Apparent Time	7	10	04	01
Sun's Place	♉	27	19	43
Sun's Right Aſc.		55	02	20
App. Time from *Noon*		151	00	15
R. A. M. *Cæli*		206	02	35
Medium Cæli ♎		28	02	55
Meridian Angle		69	01	17
Decl. Culm. Point South		10	47	58
Inclin. ☽ Orb = ∠ ☾ ☊ e		5	09	04



☞ In this Scheme the Moon is paſt the Meridian by the Diſtance B ☽; which is the reaſon that B ☽ is added to ☊ B in the following Work.

1. In the Triangle ☊ B e are known, (1.) ☊ e the Diſtance of the culminating Point from the neareſt Node = 2ſ. 10° 46′ 2″. (2.) The ∠ B ☊ e = 5° 9′ 4″, the Obliquity of the Orb, (3.) The Angle B e ☊, the Meridian Angle 69° 1′ 17″; to find the *Angle* ☊ B e, the *Angle* that the Moon's Orb makes with the Meridian, and the Sides ☊ B and B e. By the 3*d* Axiom of Oblique Sphericks.

1. For

1. For the Sides.

	o	'	"
Angle B e ☊	69	01	17
Angle B ☊ e	5	09	04
Z	74	10	21
Half	37	05	10½
X	63	53	13
Half	31	56	06½

Side ☊ e	70°	46'	02"
Half	35	23	01

		o	'	"	
As S. Half Z	L	37	05	10 Co Ar.	0.219672
To S Half X		31	56	06	9.723420
So s. Half Cr. ☊ e		35	23	01	9.851440
To s. Half X of unkown Crs.		31	55	32	9.794532

2. As C.S. Half	L	37	05	10 Co Ar.	0.098167
To C.S. Half X		31	56	06	9.928730
So s. Half Cr. ☊ e		35	23	01	9.851440
To s. Half unknown Crs.		37	04	38	9.878837
Half X — and ¼		31	55	32	
Rem. B e		5	09	06	
Sum is the Side ☊)		69	00	10	

2. For the *Angle* ☊ B e, which the Moon's Orb makes with the Meridian,

		o	'	"	
As L. B ☊		69	00	10 Co Ar.	0.029829
To S. L B e	☊	61	01	13	9.970214
So S. ☊ e		70	46	02	9.975058
To S. L ☊ B e		70	47	12	9.975143

Moon's

	°	′	″
Moon's Altitude obſerv'd	23	59	10
Parallax Altitude +	0	50	57
Sum —— —	24	50	7
Refraction ſubtract	0	1	59
True Altitude	24	48	8
Complement = ☽ Z	65	11	52

4. In the Triangle Z ☽ B, to find the *Angle* ☽, the Parallactic *Angle* in the Moon's Orb.

	°	′	″		
As *S.* ☽Z	65	11	52	Co Ar.	0.042029
To *S.* ∠ B	70	47	12		9.975110
So *S.* BZ	67	29	4		9.965566
To *S.* ∟ ☽	73	56	15		9.982705
Complement	106	3	45	Obtuſe = *Angle* Z ☽ B.	

To e ∝ Decl.	10	47	58
Add B e	5	9	6
Z = B e	15	57	4
+ ∝ R	51	32	0
☊ = B ☊	67	29	4

5. To find the Side ☽B, the Operation ſtands thus:

	°	′	″		°	′	″		°	′	″
Angle Z ☽ B	106	03	45	——	106	3	45	☊ B	67	29	4
Angle ☊ B ☽	70	47	12	——	70	47	12	☊ ☽	65	11	52
☊	176	50	57	X	35	16	33	X	2	17	12
Half	88	25	28½	Half	17	38	16½	Half	1	8	36

	°	′	″		
As *S.* half X of the given Angles	17	38	16	Co. Ar.	0.518559
To *S.* half their ☊	88	25	28		9.999836
So *t.* half given ſides	1	8	36		8.300010
To *t.* half ☽B required	3	46	27		8.818405
Double is the ſide ☽B	7	32	54	paſt the Merid.	
Add ☊ ☽	69	00	10		
Sum is ☊B	76	33	4	☽'s Diſt. à Node.	

Place

	S.	°	′	″
Place of the Node —	9	8	48	57
Moon's Diſtance from Node ſub.	2	16	35	4
Rem. Orbit Place of the Moon	6	22	15	53
Moon's Orbit-Pl. from New Tables	6	22	17	13
Difference			1	20

Thus have I given two practicable Methods, by which the true Places of the Sun and Moon may be found by Obſervation at any Place in the World; which, if at the ſame Hour their Places are calculated from my new Tables, the Difference of Meridians between that and *London* may be exactly determined.

Example. Suppoſe I am at *Jamaica* the 6th Day of *July* 1731, at half an hour paſt 10 at Night, and obſerve the Moon's Orbit Place (by the foregoing Method) to be ♌ 7° 35′ 3″; at the ſame Hour I compute the Moon's Place from my New Tables, under the Meridian of *London*, and find her Place to be ♌ 4° 28′. I demand the Difference of Longitude from *London*?

OPERATION.

Moon's Orbit Place at	*Jamaica*	♌ 7	35	03	at 10 at Night.
	London	♌ 4	28	00	
Difference		3	7	3	

Now ſay, If the Moon's Diurnal Motion give 24 Hours, or 360° (either will do,) what will the Difference of the Moon's Place give? What comes out, is the Difference of Meridians, if you took 24 Hours for the middle Term; or the Difference of Longitude in Degrees, if 360° was the middle Term.

Now

Now ſay,

° ′ ″ ° ′ ″

If 14 46 : 360 :: 3 7 3

60 60

886 187

60 60

53160 11223

360

673380

33669

53160)4040280(76

37212

31908

31896

120

60

)7200(0′

Anſwer 76° *Jamaica* lies to the Weſt of *London*.

Example 2. Admit at Fort St. *George* in the *Eaſt Indies*, on the 24th of *Auguſt* 1731, at 6 h. 15 min. P. M. the Moon be obſerved in *Libra* 14° 98′ and at 6 h. 15 min. at *London*. I find by Calculation her Place to be *Libra* 17° 24′. I demand the Difference of Longitude betwixt *London* and Fort St. *George*?

OPERATION.

Moon's Orbit Place at	*London*	♎ 17° 24′	at 6h. 15′ P.M.
	Fort St. *George*	♎ 14 38	
	Difference	2 46	

The

The Moon's Diurnal Motion is 12° 17′. Now say,

```
     °   ′     °      °  ′
If  12  17 : 360 :: 2  46
     60              60
    ----            ----
    737             166
                     360
                   -----
                    9960
                    498
                   -----
                737)59760(81°
                    5896
                   -----
                     800
                     737
                    ----
                      63
```

Answer, 81 Degrees to the East of *London*.

By the foregoing Examples it is plain, that if the Moon's Place observed, be less than it is at *London*, by Calculation for the same time, then the Meridian of the Observation lies to the East of the Meridian of *London*; if it be the same, then the Observer is under the Meridian of *London*; but if it be more than at *London*, the Place of the Observation is to the West.

And the reason is very obvious: For the Longitude of any Place from *London* is always equal to that which is measured out by the Motion of the Moon, &c. in the time that is elapsed between one Meridian and another: As in the last Example, I have found the Difference of Longitude to be 81° = 5 h. 24′. Now the Motion of the Moon in that time is 2° 46′, according to her Diurnal Motion of 12° 17′.

And here I give you to understand, that for every Minute that you miss of the Truth of the Moon's Place, you will err 27 Miles in Longitude, according to the Mean Motion of the Moon, as I thus prove:

If 13° 10′ 35″ : 360° :: 1′ : 27′?

2. The Longitude of any Place from *London* may be found by obſerving the time the Moon is upon the Meridian of that particular Place: For if you find the time of the Moon's Southing where you are to be, the ſame that it is at *London*, then you are under the Meridian of *London*; but if the time where you are be leſs than at *London*, you are to the Eaſt; if more, to the Weſt.

Therefore if there be any Difference, turn it into Degrees, and then ſay,

As the Moon's Diurnal Motion, is to 360°, what is this Difference, to work by a direct Ratio, and what comes out, is the Difference of Longitude.

Example. Admit, *Jan.* 9, 1731, I am at Sea, in the Latitude of 43 ½ North, and obſerve the Moon upon the Meridian of the Place at 10 h. 17′ P.M. apparent Time. I demand the Longitude of Obſervation from *London*, and of what Denomination?

OPERATION.

		h.	′
Moon South at	*London*	10	17
	obſerved	10	5
		0	12 = 3°

Now ſay,

As 11° 48′ : 360° : : 3 : 91° 31′ to the Eaſt of *London*.

N. B. This way of Reaſoning will require moſt accurate Inſtruments, and the greateſt Care imaginable, in uſing of them: For every Minute in Time that you err in the time of the Moon's Southing, will produce an Error of 408 Miles in Longitude, according to the middle Motion of the Moon, thus proved:

As

° ′ ″ ° ′

As 13 10′ 35 : 360 :: 15 : 408 Miles.

Note, 1 in Time is equal to 15′ in Motion, which is here the third Term.

CHAP. XIII.

To find the Moon's Viſible Place.

THE Place of the Moon (and of all the Heavenly Bodies) is calculated as view'd from the Earth's Center, and this is called the *True Place*: But becauſe we are removed from thence 3984.58 Miles, when we view the Moon from the Earth's Surface, we do not behold her in the ſame Place as an Eye would do from its Center; therefore my Buſineſs in this place ſhall be to reconcile this matter, and make the whole Proceſs as intelligible as poſſible.

When the Moon has no Latitude, then the 39th Problem of my *Syſtem* will anſwer your End: But becauſe ſhe has generally Latitude, more or leſs, it will render the Calculation a little more intricate (than is there ſhewn,) as will appear by the ſubſequent Example.

Anno 1727, *September* 15th, at 10 at Night, at *London*, Apparent Time. I would know the Moon's Viſible Place in Longitude and Latitude?

This being a Problem perfectly new, and attended with ſome Difficulty, I ſhall endeavour to make it as plain as poſſible to the meaneſt Capacity.

1. With the true Place of the Node 11ſ 21° 37′ 58″, take out the Inclination of the Moon's Orb, with the Equinoctial (Page 71, of my *Syſtem*) 28° 16′ 44″; and then ſet down the Requiſites, thus:

		D.	h.	′	″
Given Apparent Time 1727, *September*		15	08	00	00
Equation of Time ſub.	—			08	46
Equal Time	— —	15	07	51	14
Moon's Orbit Place from New Tables	♒	25	07	47	
Reduction add	——			05	49
Ecliptic Place	— —	♒	25	13	36
Moon's true Latitude South Deceſ.			2	21	06
Sun's true Place,	— —	♎	3	06	59
Sun's Right Aſcenſion	—		182	51	31
Moon's Right Aſcenſion			32	19	46
Apparent Time from Noon add			120	00	00
Sum is Right Aſcenſion *M. Cœli*			302	51	31
Complement	— — —		57	08	29
Angle of Moon's Orb with the Equinoctial			28	16	44

Now, for the *Medium Cœli* in the Moon's Orb, &c. by Problems 27, 28, 29, 30, 31, 32, 33, of my *Syſtem*. Find the Requiſites, only here make uſe of the Obliquity of the Moon's Orb 28° 16′ 44″, inſtead of the Obliquity of the Ecliptic 23° 29′.

		°	′	″	
As Radius	— —	90	00	00	10.000000
To C.S. Obliquity of ☽'s Orb		28	16	44	9.944850
So *C.t.* R.A. *M. Cœli*		57	08	29	9.810168
To *C.t.* of its Diſt. from ♈ ſub.		60	21	57	9.755018
From *Aries*, or	12ˢ.	00	00	00	
Rem. ☽'s Orbit Place on Merid.	9	29	38	03	
But in the Ecliptic	♒	00	38	35	

2. For the Meridian Angle in the Moon's Orb.

		°	′	″	
As Radius	— —	90	00	00	10.000000
To S. Obliquity Orb		28	16	44	9.675561
So C.S. R.A. *M.C.*		57	08	29	9.734454
To C.S. Merid. Angle ☽'s Orb		75	06	18	9.410015

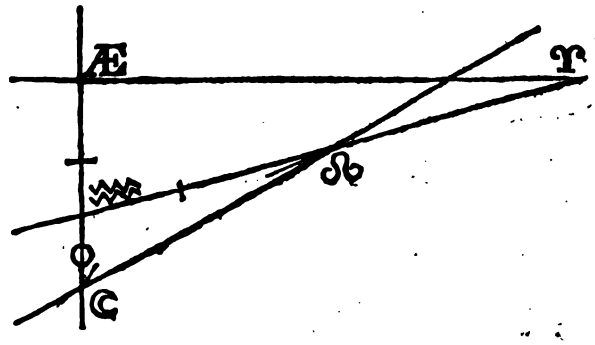
3. To

3. To find the Declination of the culminating Point in the Ecliptic.

		o ′ ″	
As Radius	—	90 00 00	10.000000
To T. Obliq. of the Eclip.		23 29 00	9.637956
So S. R. A. *M.C.* in Eclip.		57 08 29	9.924286
To *t.* Declin. Culm. Point		20 03 00	9.592242

4. To find the Declination of the Culminating Point in the *Moon*'s Orb.

First, Find the ſame Point's Declination in the Ecliptic, as in the *Third* above; and alſo the *Medium Cœli* in the Ecliptic, which in this Example is ♒ 0° 38′ 35″; from which Place in the Ecliptic, always ſubtract the Place of the neareſt Node, and you will have the Diſtance of the ſaid Node in



the *Medium Cœli* in the Ecliptic, which in this Scheme is equal to ☊ ♒ 1*s.* 20° 59′ 23″, the Angle ☊ ☽ ♒ is the Meridian Angle in the *Moon*'s Orb = 75° 6′ 18″ found in the Second, and the Angle ☽ ☊ ♒ is 5° 10′ 29″, being the Inclination of the *Moon*'s Orb and Ecliptic, and is thus obtained:

		°	′	″	
As Radius	—	90	00	00	10.000000
To S. greateſt X of Obliq.		0	17	45	7.712791
So S. Diſt. ☽ à ☉		37	53	23	9.788270
To S. add		0	10	54	7.501061

Now you are to obſerve, that if the Diſtance of the *Moon* from the *Sun*

			°	′	″
be { 3, 4, 5, 9, 10, 11 Signs, add to			4	59	35 } the
{ 0, 1, 2, 6, 7, 8 Signs, ſub. from			5	17	20 }

Sum or Difference is the true Obliquity of the *Moon*'s Orb with the Ecliptic at that time.

So in the Example above it is 5° 10′ 29″.

Now in the Triangle ☊ ☽ ♒ we are to find ☽ ♒, which is the Diſtance of the *Moon*'s Orb from the Ecliptic upon the Meridian Æ ♒; which being found, is to be ſubtracted from the Declination of the culminating Point in the Ecliptic, if the *Moon*'s Orb lie between the Ecliptic and Equinoctial (as in this Example;) but to be added, if the *Moon*'s Orb lies without, as your own Reaſon will always direct.

Now for ☽ ♒ ſay,

		°	′	″	
☊ ☽ ♒ As S. Meridian ∠ in *Moon*'s Orb		75	6	18	Co Ar. 0.014844
To S. ☽ ☊		50	59	23	9.890439
So S. Obliq. Orb and Eclip.		5	10	29	8.955129
To S. ☽ ♒ add		4	9	30	8.860412

Now, becauſe the Angle of the *Moon*'s Way with the Equinoctial is more than the Obliquity of the Ecliptic, ☽ ♒ muſt be added to Æ ♒. See the Table in my *Syſtem*, Pages 71, 72.

To

	°	′	″
To ♐ ♒, as found in the *Third*	20	00	00
Add ♒ ☽	4	09	30
Sum is ♐ ☽, the Declination of the Culm. Point in ☽'s Orb	24	09	30
Alt. Equator at *London*,	38	28	00
Alt. *M.C.* in the *Moon*'s Orb	14	18	30

4. For the Altitude of the Nonageſime Degree in the *Moon*'s Orb.

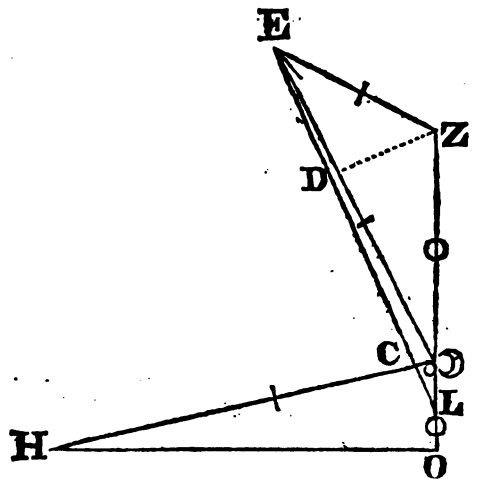
	°	′	″	
As Radius —	90	00	00	10.000000
To S. Meridian Angle	75	6	18	9.985156
So C.S. Alt. *M.C.* in *Moon*'s Orb	14	18	30	9.986319
To C.S. Alt. Nonageſ. Degr.	20	32	22	9.971475

5. For the Diſt. of *Mid-Heaven* from the Nonageſime Degree in the *Moon*'s Orb.

As Radius —	90	00	00	10.000000
To C.S. *Meridian Angle*	75	6	18	9.410015
So C.t. Alt. *M.C.* in *Moon*'s Orb	14	18	30	10.593372
To t. Diſt. *M.C.* à Non. Degr. +	44	46	36	10.003387
Med. Cœli in *Moon*'s Orb	9S.	29	38	3
Nonag. Degr. in ☽'s Orb	11	14	24	39
Sub.	3	00	00	00
Rem. the Deſcendant	8	14	24	39
Moon's true Orbit Place	10	25	7	47
Rem. ☽ from the Deſcend.	2	10	43	8
From the Nonag. Degree	0	19	16	52

6. To find the *Moon*'s true Altitude.

In this Scheme, E repreſents the Pole of the *Moon*'s Orb,



Z the Zenith, ☽ the true, and L the viſible Orbit Place of the *Moon*; then is EZ, the Diſtance of the Zenith from the Pole of the *Moon*'s Orb, equal to the Altitude of the Nonageſime Degree in the *Moon*'s Orb 20° 32′ 22″; ☽E is always known to be 90°, the diſtance of the *Moon* from the Pole of her Orbit; and the Angle ☽EZ being the difference between the *Moon*'s Orbit Place, and the Place of the Nonageſime Degree in the *Moon*'s Orb equal to 19° 16′ 52″, to find Z☽, the Complement of the *Moon*'s true Altitude.

Let fall the Perpendicular DZ, and then ſay,

	°	′	″	
[As *C.t.* ZE Alt. Nonag.	20	32	22	10.426351
To Radius	90	00	00	10.000000
So C.S. ∠ ☽EZ Diff. Lon.	19	16	52	9.974931
To *t.* DE, the 4th Arch	19	28	35	9.548580
From ☽E	90	00	00	always the ſame.
Rem. ☽D, the 5th Arch	70	31	25	

As

As C.S. 4th Arch = DE	19	28	35	Co Ar.	0.025589
To C.S. 5th Arch = D☽	70	31	25		9.522989
So C.S. EZ Alt. Nonag.	20	32	22		9.971475
To S. O☽, the true Alt.	19	20	23		9.520053

7. For the Parallactic Angle = H ☽ O in the Moon's Orb.

	°	′	″	
As Radius	90	00	00	10.000000
To *t.* O☽ her true Altitude	19	20	23	9.545274
So C.S. H☽, *Moon* from Deſcend.	70	43	8	9.543851
To C.S. H☽O, the Parall. Angle	82	56	51	9.089125

8. For the *Moon*'s Horizontal Parallax.

1. For the *Moon*'s Eccentricity.

	°	′	″		
As S. Equation Apogeon	6	00	49	Co Ar.	0.979785
To the conſtant Number		11731	′		4.069354
So S. double Annual Argum.	35	28	22		9.763664
To the *Moon*'s Eccentricity		64983			4.812803

But more Correctly thus: Suppoſing the Logarithm of the mean Diſtance of the *Moon* from the Earth to be 10.0000000.

RULE.

To the Exceſs of the Co Secant of the ſecond Equation of the Apogeon above the Radius, add the Sine of the Double of the Annual Argument, and the Conſtant Logarithm 8.0691869, and you will have the Logarithm of the *Moon*'s true Eccentricity at that time.

OPE-

OPERATION.

	° ′ ″		
Second Equation of Apog.	6 0 49	Co Sec.	.9797852
Double *Annual Arg.*	35 28 22	Sine	9.7636646
Conſtant Logarithm	----		8.0691869
Logarithm of the Eccentricity,			8.8126367
Reject 4 from Characteriſtic, then 64958			4.8126367

2. For the Moon's Diſtance from the Earth.

	☉ ′ ″		
As S. Elliptic Equation	3 22 25	Co Co Sec.	1.230479
To double Eccentricity	129966		5.113829
So S. ∠ at upper Focus	29 6 8		9.686966
To Diſt. *Moon* from the ☉	1074173		6.031074

But more correctly, thus, ſuppoſing the Logarithm of the mean Diſtance of the *Moon* from ☉ to be 10.0000000.

RULE.

Take the Sum and Difference between the true *Anomaly* and *Angle* of the Upper Focus; and alſo the half of Sum and Difference.

Then to the Sine of the *Angle* at the Upper Focus, add the Exceſs of the Co Secant above the Radius of the half Sum, and the Secant of the Radius of the half Difference: The Sum of theſe three ſhall be the true Logarithm of the Diſtance of the Moon from the Earth.

Example to the time above.

OPERATION.

	S. ° ′ ″		
True Anomaly	11 4 19 22		
Angle at Upper Focus	11 0 53 52	Sine	9.6871325
Sum	10 5 13 14		
Half	5 2 36 37	Co Sec.	.3362300
Difference	0 3 25 30		
Half	0 1 42 45	Sec.	.0001940
Logar. of *Moon*'s Diſtance from the *Moon*			10.0235565

3. For the *Moon*'s Horizontal Parallax in the *Syzygia*.

Now becauſe Sir *Iſaac Newton* makes the mean Horizontal Parallax of the *Moon* in the *Syzygias* 57′ 30″, and in the Quadratures 59′ 40″, the difference being 2′ 10″ = 130″, therefore we muſt find what it will be to the Diſtance of the *Moon* from the *Sun* at any particular time, thus, in the Example above the diſtance of the *Moon* from the *Sun* is 4ˢ. 22° 6′ 37″.

Now ſay,

As Radius —	90 00 00	10 000000
To whole diff. of ☌, ☍, and □	130″	2.113943
So S. Diſt. ☽ à ☉	37 53 23	9.788270
To the 4th proportional Number	79.8	1.902213

Then, if the Diſtance of the *Moon* from the *Sun*

be { 0,1,2,6, 7, 8 Signs, add to 57′ 30″ } the Sum or
{ 3,4,5,9.10,11 Signs, ſub. from 59 40 } Difference is the Parallax, according to the Diſtance of the *Moon* from the *Sun* at that time; ſo in the Example above, the proportional Number 1′ 19″.8 is to be ſubtracted from 59′ 40″, there remains 58′ 20″.

Now for the Horizontal Parallax of the *Moon*, ſay,

As

As preſent Diſt. of ☽ à ☉	—		10.0235565
To the Mean	—	—	10.0000000
So S. Horiz. Parall. of Diſt. ☽ à ☉	58°	20′	8.2296079
To S. true Horizontal Parallax	55	15	8.2060514

9. For the Parallax of the *Moon* in Altitude.

	°	′	″	
As Radius —	90	00	00	10.000000
To C.S *Moon*'s Altitude	19	20	23	9.974775
So S. Horizontal Parallax	0	55	15	8.206026
To S. Parall. in Altitude L ☽	0	52	01	8.180801

10. For the *Moon*'s Parallax in Longitude.

	°	′	″	
As Radius —	90	00	00	10.000000
To C.S. Parallactic Angle	82	56	51	9.089123
So *S.* Parallax in Altitude	00	52	01	8.179901
To *t.* Parallax in Longitude	00	06	24	7.269024

11. For the Parallax in Latitude.

	°	′	″	
As Radius —	90	00	00	10.000000
To S. Parallax in Altitude	00	52	01	8.179851
So S. Parallactic Angle	82	56	51	9.996701
To S. Parallax in Latitude	00	51	38	8.176552

12. To find the Parallax in Longitude by the Log. Logar.

OPERATION.

	°	′	″		
Horiz. Parallax of the *Moon*	00	55	15	LL	2.964181
Altit. Nonageſim. Deg. in ☽ Orb	20	32	22	S.	9.545124
Diſt. Moon from *Nonag. Degr.*	19	16	52	S.	9.518781
Parallax Longit. of the Moon	00	06	24	LL	9.028086

13. To

13 To find the Parallax in Latitude by the Log. Logarithms.

OPERATION.

	°	′	″	
Horizontal Parallax of the Moon	00	55	15	LL 9.964181
Altit. of Nonag. Degr in ☽ Orb	20	32	22	C.S. 9.971475
Parall. in Latitude of the Moon	00	51	44	LL 9.933656

N. B Becauſe of the Smallneſs of the Triangle C☽L in Page 152, the Sides may be reduced into Seconds, and ſo reſolved as a plain Triangle.

And becauſe the Moon is in the Occidental Quadrant, the Parallax in Longitude muſt be ſubtracted; ſee my *Syſtem* Page 179.

	°	′	″
Moon's true Ecliptic Place ♒	25	13	36
Parallax in Longitude ſub.		6	24
Moon's viſible Longitude ♒	25	07	12
Moon's true Latitude South	2	21	6
Parallax in Latitude add		51	38
Moon's Viſible Latitude South	3	13	07
Moon's true Altitude	20	12	48
Parallax in Altitude ſub.	00	52	01
Moon's viſible Altitude	19	20	47
Refraction add		2	38
Moons Altitude corrected	19	23	45

By what goes before, it is plain, that the Parallaxes and Refractions are of a contrary kind, *viz.* where the one is added, the other is ſubtracted, *& contra*; ſee my *Syſtem*, Page 177.

Note, When the *Sun* and *Moon* are not conjoined, as in the Example above, then you muſt find the Parallaxes of the *Moon*, and not of the *Moon* from the *Sun*, as is done in the next Example.

In the Triangle ☽EZ, a certain Author adviſes to find the Angle E☽Z, and that ſhall be the Complement of the Parallactic Angle: But this never holds true, but when the

the Moon is at her greateſt Limit of Latitude, or 90 Degrees diſtant from her Nodes: For then doth the Circle of Longitude E ☽ fall at right Angles upon the *Moon*'s Orb, and never elſe; ſo that at other times you muſt find the parallactic Angle, as I have ſhewn above.

Alſo, if you would find the Parallaxes by the Table of the *Parallaxes* hereunto annexed, you muſt enter with the Altitude of the Nonageſime Degree, and its Complement in the Moon's Orb, and not in the Ecliptic; for when the *Moon* has South Latitude (as in the Example above) the Altitude of the Nonageſime Degree in the *Moon*'s Orb is leſs than it is in the Ecliptic; but when the *Moon* has North Latitude, then 'tis more.

14. For the *Moon*'s apparent Diameter at the ſame time.

Here are three things to be conſidered.

1. In reſpect of the Horizon.

2. In reſpect of the *Moon*'s Altitude.

3. In reſpect of the *Moon*'s diſtance from the Earth.

For Sir *Iſaac Newton* has determined the Horizontal Semidiameter in the *Syzigias* 15′ 45″, and in the Quadratures 15′ 31″ ½; therefore we muſt firſt find what the Horizontal Semidiameter will be, in reſpect of the Diſtance of the *Sun* and *Moon* at any given time, it will always hold.

		° ′ ″	
As Radius	——	90 00 00	10.000000
To the Diff. of Semid. in ☌, ☍, and □	13.5		1.130334
So Si. Diſtance ☽ à ☉		37 53 23	9.788270
To the 4th proportional Part		8.3	0.918604

Now obſerve, if the Diſtance of the ☽ from the ☉ be ☋ 0, 1, 2, 6, 7, 8 Signs, ſub. from 15′ 45″ ☊ the Sum or ☊ 3, 4, 5, 9, 10, 11 add to 15 31½ ☋ Difference is the Horizontal *Semidiameter* in reſpect of the Diſtance of the *Sun* and *Moon* at the given time.

So

So in the Example before us, the Fourth proportional Number 8″.3 is to be added to 15′ 31″.5, and the Sum 15′ 39″.8 is the Moon's Horizontal apparent *Semidiameter*, according to the Diſtance of the Moon from the Sun 4ˢ. 22° 6′ 37″.

In the 34th Page of my *Syſtem of the Planets demonſtrated*, I have proved, that the Heavenly Bodies are nearer the Obſerver when on the Meridian, than when in the Horizon, by near the Earth's Semidiameter: Whence it is manifeſt, that the Apparent Diameters of the Planets are leaſt in the Horizon, and greateſt in the Zenith; and are to each other at thoſe reſpective Diſtances, as the Sines of thoſe reſpective Diſtances from the Zenith.

For this purpoſe I have annexed the following Table, which enter with the Moon's Altitude 19° 20′ 23″; and becauſe ſhe is nearer the Apogeon than the Perigeon I take out the Augmentation of her Diameter 10″, therefore the Moon's apparent Semidiameter in reſpect to her Altitude is 15′ 44″.

Laſtly, For the true apparent Semidiameter of the Moon in reſpect of her preſent Diſtance from the Earth.

		′	″	
As the Horiz. Parall. of Diſt. ☽ à ☉	58	20	Co Ar.	878
To preſent Horizontal Parallax	55	15		358
So Apparent Semid. Altitude	15	45		5810
To true Apparent Semidiameter	14	55		6046

The Table is thus made:

The Moon's Zenith Diameter exceeds her Horizontal in Perigeon 36″. I would know, how much her Horizontal Diameter muſt be encreaſed at the Altitudes of 30 and 60 Degrees ſeverally?

Argu-

To Augment the Horizontal Diameter.

Alt. ☉ *and* ☽ °	*The* ☽*'s Apog.* ″	*The* ☽*'s Perig.* ″	☉*'s Parallax.* ″
0	0	0	10
2	1	1	10
4	2	2	10
6	3	4	10
8	4	5	10
10	5	6	10
12	6	7	10
14	7	9	10
16	8	10	10
18	9	11	10
20	10	12	10
22	11	13	10
24	12	15	9
26	12	16	9
28	13	17	9
30	14	18	9
32	15	19	8
34	16	20	8
36	17	21	8
39	18	23	8
42	19	24	7
45	20	25	7
48	21	27	7
51	22	28	6
54	23	29	6
57	23	30	6
60	24	31	5
63	25	32	5
66	26	33	4
69	26	34	4
72	27	34	3
75	27	35	3
78	28	35	2
81	28	35	2
84	28	36	1
87	28	36	1
90	29	36	0

OPERATIONS.

		° ′	
As Radius — —		90 0	10.000000
To Diff. of Horiz. and Zenith Diameters		36″	1.556302
So S. Altitude ☽		30 0	9.698970
To the Quant. to be added to Horiz. Diam.		18	1.255272

Again,

		° ′	
As Radius — —		90 00	10.000000
To Diff. of Horiz. and Zen. Diam.		36	1.556302
So *S.* Alt. ☽ —	—	60 00	9.937531
To Quant. to be add. to Horiz. Diam.		31	1.493833

And after this manner is the Table calculated; in which is alſo given, the *Sun*'s Parallax anſwering to the Altitude.

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15. Find the Greateſt and Leaſt Horizontal Parallax of the Moon in the *Syzigia*.

1. For the Leaſt.

As the Greateſt Diſtance of ☽ à ☉			6.0280736
To the mean Diſtance	—		6.0000000
So mean Hor. Parall. in the *Syzigia*		57° 30′	8.2233523
To S. Leaſt Horizontal Parallax		53 54	8.1952787

2. For the Greateſt.

As the Perigeon Diſtance of ☽ à ☉			5.9700320
To the mean Diſtance	—		6.0000000
So S. mean Horizontal Parallax		57′ 30″	8.2233573
To S. Greateſt Horizontal Parallax		61 36	8.2533253

The Table in Page 110, differs a ſmall matter from this; becauſe that Table is made to ſerve as well for the Moon's Eclipſe as the Sun's.

16. To find the Moon's Greateſt and Leaſt Apparent Semidiameter in the *Syzigia*.

1. For the Leaſt.

	°	′		
As mean Horiz. Parall. in the *Syzigia*	57	30	LL Co Ar.	815
To the mean Semidiameter	15	45		5809
So Apogeon Horiz. Parallax	53	54		466
To leaſt apparent Semidiameter	14	46		6090

2. For the Greateſt.

As the mean Horizontal Parallax	57	30	LL	185
To the mean Semidiameter	15	45		5809
So Perigeon Horizontal Parallax	61	36		114
				Σ 299
To Greateſt apparent Semidiameter	16	52		5510

Example 2. Let the Viſible Place of the Moon be ſought at the time of the Viſible Conjunction of the Sun and Moon *Anno* 1737, *February* 18, 3 h. 4′ 22″ at *London*. See the Synopſis, and mark it well.

	d.	h.	′	″
Given Apparent Time 1737, *February*	18	03	04	22
Equation of Time add			12	43
Equal Time	18	03	17	05
Moon's Orbit-Place	11	11	30	35
North Node	05	17	57	29
Argument of Latitude	05	23	33	06
True Latitude Moon North Deſc.		00	35	33
Reduction add			01	33
Ecliptic Place	11	11	32	08
Sun's Place	11	11	08	44
Sun's Right Aſcenſion		342	36	33
Apparent Time from Noon add		46	05	30
Sum is Right Aſcenſion *Med. Cœli*		28	42	03
Angle Moon's Orbit with Equinoctial		18	54	08
Angle Moon's Orbit with Ecliptic		05	16	29

Di-

		°	'	"
Diſtance in the Equator to be ſubtracted		07	26	40
Culminating Point in the Moon's Orb	♉	00	03	30
Meridian Angle in the *Moon's* Orb		73	29	31
Right Aſcenſion *Med. Cœli* Moon's Orb		21	25	29
Declination of the Culm. Point Moon's Orb		07	11	05
Altitude Mid-Heaven in the Moon's Orb		45	39	03
Aſt. Nonageſime Degree in the Moon's Orb		46	43	57
Nonageſime Degree in the Moon's Orb	♉	15	34	54
Deſcendant -- - ----	♏	15	34	54
Moon's Orbit-Place from the Deſcendant		85	55	42
Moon from the Nonageſime Degree	2	04	04	19
Moon's true Altitude ---		18	33	57
Parallactic Angle in the Moon's Orb		46	18	11
Second Equation of the Apogeon		08	55	58
Annual Argument	11	02	08	10
Mean Anomaly of the ☽	11	09	02	48
Angle at the Upper Focus	11	09	00	19
Elliptic Equation		02	22	46
The Moon's Eccentricity 62435	Logar.	4795428		
Diſtance of the Moon from the Earth		6.032457		
Horizontal Parallax of ☽ à ⊕			53	11
Moon's Parallax in Altitude from the Sun			50	25
in Longitude ☽ à ☉			34	35
in Latitude ☽ à ☉			36	27
Moon's apparent Semidiameter			14	57
Moon's true Ecliptic Place	11	11	52	8
Parallax Longitude ſub.			34	50
Moon's Viſible Ecliptic Place	11	10	57	18
Moons true Latitude North Deſcend.			35	33
Parallax of Latitude			36	27
Viſible Latitude ☽ South			00	54
Moons true Altitude		18	33	57
Parallax in Altitude of the Moon ſubtract		00	50	35
Viſible Altitude of the Moon		17	43	22
Refraction add			02	30
Viſible Altitude of the Moon corrected		17	45	52

These Parallaxes may all be found in the Tables of *Parallaxes*, and by the Logiſtical Logarithms, exactly agreeing with what was found before by help of the *Parallactic Angle*, and *Parallax* in *Altitude*.

By which it appears, that when you have found the Altitude of the Nonageſime Degree in the Moon's Orb, and the Diſtance of the Moon from the Nonageſime Degree, that then you may find the Parallax in Longitude and Latitude by the Logiſtical Logarithms more ſpeedily than by the *Parallactic Angle*.

This Method of mine, of finding the Nonageſime Degree in the Moons Orb, *&c.* was entirely unknown to the the Antients, and conſequently the Moons true Parallaxes were never truly found till now; as I have proved by many Examinations of the Works both of the antient and modern Aſtronomers.

They never knew a direct Method of taking the Nonageſime Degree in the Moons Orb, for want of aſcertaining the true Obliquity of her Orb with the Equinoctial and Ecliptic; a Problem as uſeful in this Science, as the Light of the Sun is to the Eyes.

CHAP.

CHAP. XIV.

Of the Moon's Mean Motion, and how the Anticipations of the New Moons may be found by the Epacts.

IN my *Aſtronomical Definitions*, Vol. I. of my *Syſtem*, I have given, under the Word ÆRA, ſuch Periods of Time, as are moſt uſed in the known World: And becauſe it is by the Sun's (apparent) Motion that we meaſure Time, I ſhall make it my buſineſs in this Chapter to ſhew, how the true and mean Tropical Years are found, with their juſt Lengths; which from my *Aſtronomical Tables* ſtand thus:

			d.	h.	′	″
Sun enters *Aries*	1733	*March*	9	2	9	35
	1734		9	7	58	37
True Length of the *Tropical Year*			365	5	49	2

The Operations of the mean Times ſtand thus:

	S.	°	′	″	‴	
1733	9	20	58	21	00	
Mar. 11	2	8	59	42	00	
0 h. 47′			1	55	49	
29″				1	11	
☉ in ♈	0	0	00	00	00	

	S.	°	′	″	‴	⁗
1734	9	20	44	1,	0	0
Mar. 11	2	8	59	42	0	0
6			14	47	0	0
36			1	28	43	0
31				1	56	23
15						37
☉ in ♈	0	0	0	0	0	0

From the mean Time that the Sun enters *Aries* 1734, take the mean Time that he enters *Aries* 1733, and the Difference is the true time of the Length of the Tropical Year, and the Work ſtands thus:

			d.	h.	′	″	‴
Anno 1734	Sun in *Aries*	*March*	11	6	36	31	15
Anno 1733	mean Time	*March*	11	2	47	29	00
True Length of the *Tropical Year*			365	3	49	02	15

In the next place, we muſt find the true Length of the Lunar Year.

In order hereunto, we muſt firſt find the true Length of each mean Lunation, or the true length of each Synodical Month; which multiplied by 12, will give the Length of the Lunar Year, whoſe Difference from the Solar Year is the Epact, as is manifeſt from the following Work.

	d.	h.	′	″	‴
The Moon in one Hour moves nearly	00	00	32	56	27
Which makes the time of one Revolution	27	07	43	07	00

This known, then, either by the Single Rule of Three Direct, or by my *Aſtronomical Tables* in the Second Volumn of my *Syſtem*, You will find the Sun move in that time (according to apparent middle Motion) 26° 55′ 46″; the Moon (according to mean Motion) will move 26° 55′ 46″ in 2 days, 1 hour, 3 min. 2 ſec. and the Sun in that time, 2 degr. 9 min. 52 ſec. &c. as is here ſet down.

Time ☽*'s Revolution.*				⊙ *moves in that time*			
d.	h.	′	″	°	′	″	
27	7	43	07	26	55	46	
2	1	03	02	2	00	52	
	3	40	09		09	03	
		16	29			41	
		01	14			03	
			05			00	12″
29	12	44	6	29	6	25	12

By

By this it appears, that the mean Time between one Conjunction and another of the Sun and Moon, is 29 Days, 12 hours, 44 min. 6 ſec. which multiplied by 12 Months, gives 354 days, 8 hours, 48 min. 12 ſec. for the Length of the Lunar Year; which taken from the Solar Year, 365 days, 5 hours, 49 min. 2 ſec. 15‴, leaves 10 days, 20 hours, 59 min. 50 ſec. 15‴ for the Epact.

Or, the ſame may be found, by adding the time of the Lunation, 29 days, 12 hours, 44 min 6 ſec. to it ſelf 12 times; and then the Day of the Month that each Lunation ends upon, may be found by the Table of Days in my *Satellite Aſtronomy*, Page 94, as appears more at large by the Work.

	D.	h.	′	″	
1	29	12	44	6	*January* 29.
2	59	1	28	12	*February* 28.
3	88	14	12	18	*March* 29
4	118	2	56	24	*April* 28.
5	147	15	40	30	*May* 27.
6	177	4	24	36	*June* 26.
7	206	17	08	42	*July* 25.
8	236	5	52	48	*Aug.* 24.
9	265	18	36	54	*Sept.* 22.
10	295	7	21	00	*Octob.* 22.
11	324	20	5	6	*Novemb.* 20.
12	354	8	49	12	*Decemb.* 20. Moon's Year.
	365	5	49	2	15 Sun's Year.
X	10	20	59	50	15 Epact.

But to avoid Fractions in Practice, the Epact is called 11, which, you ſee, is too much by 3 hours, 0 minutes, 9 ſeconds, 45‴.

Further, if you obſerve the Days of the Month of each Lunation in the Table above, wants juſt ſo much of 30, as is the Number of Months that we add to the Epact to find the ☽'s Age, or Day of Change, as *Street* in his Verſes has it, viz.

Jan. 0, 2, 1, 2, 3, 4, 5, 6,
7, 8, 10, 10, theſe to the Epact fix, &c.

Now, if the Length of the Solar Year 365 Days, 5 hours, 49 min. 2 sec. 15‴ be divided by the mean Time of one Lunation, 29 Days, 12 hours, 44 min. 6 sec. the Quotient $12\frac{[illegible]}{[illegible]} = 12\frac{[illegible]}{[illegible]}$ are the Number of Lunations in one Solar Year compleat.

Or, divide the Circumference of the whole Zodiac, 360, by 29 Days, 6 min. 25 sec. the mean motion of the Sun in one Lunation, the Quotient $12\frac{38580}{[illegible]}$, nearly the same as before are the Lunations in one Solar Year; which is in its lowest Term $12\frac{7716}{[illegible]}$.

Also, if the Length of the Solar Year, 365 days, 5 hours, 49 min. 2 sec. 15‴ be divided by 27 days, 7 hours, [illegible] min. 7 sec. the ☽'s periodical Month, the Quotient 13 [illegible], are the Number of Revolutions in a Solar Year Compleat.

Lastly, If we divide 19 *Julian* Years by the [illegible] one mean Lunation 29 days, 12 hours, 44 min 6 sec [illegible] shall have $235\frac{4590}{[illegible]}$, or in its lowest Term, $235\frac{[illegible]}{[illegible]}$ which are the Lunations that happen in 19 *Julian* Years; and 19 *Julian* Years are equal to 6939 days, 18 hours.

OPERATION.

```
   d.  h.
  365  6
   24
 ------
 1466
 730
 ------
 8766 Hours.
   19 Years.
 ------
 78894
 8566
 ------
24)166554(6939 d. — 18 h.
```

Then

Then, to find in what time 235 Lunations are made, allowing the time of one Lunation to be 29 d. 12 h. 44′ 6″, the Work ſtands thus:

If 1 : 29 d. 12 h. 44′ 6″ :: 235 ?

There doth come out 6939 Days, 16 hours, 43 min. 30 ſec. which are leſs than 19 *Julian* Years by 1 hour, 16 min. 30° ſeconds. For,

	d.	h.	′	″
19 *Julian* Years are	6939	18	00	00
235 Lunations are performed in	6939	16	43	30
Difference		1	16.	30

And conſequently, the New Moons after 19 *Julian* Years will not return to the ſame Hour of the Day; but will happen 1 hour, 16 min. 30 ſec. ſooner; which in the ſpace of 357 $\frac{2970}{4950}$ Years will amount to one intire Day, as appears by this Work:

	d.	′	″		Y.		h.	Y.	
If	1	16	30	:	19	::	24	257 $\frac{2970}{4950}$	$=\frac{3}{5}$?

But, according to ſome Authors, it will be but 310 $\frac{350}{3295}$ Years; becauſe they make the Length of the Lunar Synodical Month conſiſt but of 29 days, 12 hours, 44 minutes, 3 ſeconds; therefore 235 Lunations are made in 6939 days, 16 hours, 31 min. 45 ſec. which are leſs than 19 *Julian* Years by 1 hour, 28 minutes, 15 ſeconds.

But *Kingſley*, in his Ephemeris for the Year 1712, makes it 6939 days, 16 hours, 32 min. 28 ſec. 5‴; that is, 1 hour, 27 min. 31 ſec. 55‴ ſooner.

The Lunations return in 19 Years, which amounts to one Day in 312 $\frac{181320}{5[illegible]}$ Years, nearly agreeing with *John Newton* in his *Coſmography*, Page 375.

See *Keil's Aſtronomical Lectures*, where he makes it but 304 Years that the Lunation will make up to compleat one whole Day.

Now

Now, how theſe Authors make the time of the mean Lunation to be only 29 days, 12 hours, 44 minutes, 3 ſeconds, they do not any where inform us: This is ſhorter than what I make it, by 3 Seconds. This difference may ſeem inconſiderable; yet in proceſs of time it will make a conſiderable Error.

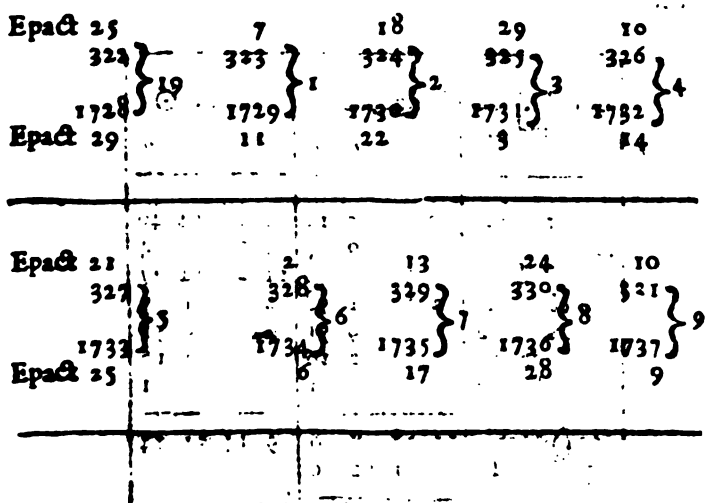
And now, becauſe the New Moons do not return at the End of 19 Years, exactly at the ſame time of the Day, but 1 hour, 16 minutes 30 ſeconds ſooner than they did 19 Years before; and that in 357 Years they will anticipate one Day; which proves that the Epact it ſelf varies 1 in every 357 Years; that is, for every 357 Years paſt, one Day is to be ſubtracted; and for every 357 Years to come, the Epact is to be increaſed by 1; that is, when you have found the Epact in the *Julian* Account, according to the common method, for every 357 Years, from the Year of the *Nicene* Council 322 (ſome ſay, it was in the Year 325, *Booker* ſays, it was in 326,) you are to add 1 to the *Julian* Epact: And from the *Roman* Epact ſubtract ſo many Days from the *Engliſh* Epact, as are the difference between the two Accounts in that Century.

As, for Example; in the Year 1734, the *Engliſh* Epact is 6; from which take 11, the difference between the *Julian* and the *Gregorian* Epact (by borrowing 30) there remains 25, for the *Gregorian* Epact.

At the *Nicene* Council they placed the Golden Number right againſt the Day of the Month in the Kalendar, on which the *Moon* Changed, and ſo was of good uſe to find the Day of the New ☽, and alſo the Feaſt of *Eaſter*; but for the reaſons above given, (concerning the Epact) the former of theſe is become wide of all Truth: The preſent Age has gained no leſs than Four whole Days, ſince the *Nicene* Council; that is, the Moon that Changed on the 29th Day of *December* then, will in this Age Change on the 25th Day of the ſame Month.

As, for Inſtance; I find a Number of Years between 1734 and the time of the *Nicene* Council, that being divided by 19, leaves for the Remainder, nothing; which Number of Years are 1406; which taken from 1734, leaves 328; in which

which ſaid Years, *viz.* 328, and 1734, the Golden Number is 6 3; and in that Interval of Years there are Seventy four Revolutions of the Golden Number, and (near) Four of the Epact. By which I prove, that the Epact muſt be leſs in the Year 328, by 4, than it is in the preſent Year 1754, as appears more plain from the following Table, wherein I have placed the Years of the *Nicene* Council, and the Years of the preſent Age together, with the Golden Number to thoſe Years, and alſo the Epacts anſwering each, ſeverally; whoſe Difference of the Epacts, you ſee, are Four.



From this Table, it is plain, that if you take the Epact for any Year about the time of the *Nicene* Council, as ſuppoſe 322, the Epact was then 25; and add to it for the Month of *December* (according to Page 167) this Sum 25, taken from 60, leaves 25 for the Day of the New Moon; over-againſt which Day, in the Kalendar of our Common Prayer-Book, you will find the Golden Number 19 placed, and ſo they placed the Golden Number over-againſt the Day in every Month on which the *Moon* Changed.

If

If therefore you place the 19 Golden Numbers, or Primes, right againſt the Day in each Month, on which the Moon Changeth, you will have a Table of the Days of the New Moons in this Age, and will ſerve for near 357 Years to come.

That my young Aſtronomical Reader may be furniſhed with every thing for his purpoſe (with things) of this kind, I ſhall here inſert the Calculations of the Sun's Ingreſs into the Equinoctial Sign *Aries* in the Year of Chriſt 322, it being the firſt Year of the *Nicene* Council, and is, from my Tables, as follows.

Equal Time at *London*.	Longit. ☉ S. ° ′ ″	Anom. ☉ S. ° ′ ″
Radix 301	9 10 9 10	6 26 54 40
Years 20	0 0 9 4	11 29 48 4
Years 1	11 29 45 40	11 29 44 37
March 20	2 17 51 58	2 17 51 45
Hours 4	9 51	9 51
Minutes 55	2 16	2 16
Seconds 35	1	1
Mean Mot.	11 28 8 0	9 14 31 14
Equat. add	1 52 0	
Sun in *Aries*	0 0 0 0	

But

But the mean Time of the Vernal Equinox happens thus:

Equal Time		Longitude Sun.			
		S.	°	′	″
Radix	301	9	10	09	10
Years	20	00	00	09	04
Year	1	11	29	45	40
March	22	2	19	50	14
Hours	2			04	56
Minutes	22				54
Seconds	37				2
Sun in *Aries*.		00	00	00	00

At the beginning of this Chapter I told you, that the Sun enter'd *Aries* this Year 1734, *March* the 9th day, 7 hours, 58 min. 37 sec. under the Meridian of *London*; which is sooner than it did at the time of the *Nicene* Council by 10 days, 20 hours, 56 min. 58 sec. (not regarding the Difference of Meridians in this Case.)

The *Julian* Year, 365 days, 6 hours, exceeds the Tropical Year 365 days, 5 hours, 49 min. 2 sec. 15‴, by 10 min. 57 sec. 45‴; therefore to know in what time this will amount to a whole Day, say thus:

If 10′ 57″ 45‴ : 1 Year : : 24 h. : 131 Y. $\frac{14485}{39465}$ equal to 131 $\frac{2817}{7893}$ Years?

Here you see, that in 1412 Years the time of the Vernal Equinox has gone back 10 days, 20 hours, 56 min. 58 sec. so that if the *Julian* Year goes on thus, without any Correction, in Process of time the Sun will come to enter *Aries* on *Christmas* Day: And to know how many Years it will be 'ere it come to be so, is made manifest from this Work:

Dec. 6

Dec. 6
Jan. 31
Feb. 28
Mar. 9

D.
If 1 : 141.3569 :: 74 Days.
74

5254276
91949.83

9720.4106
1734 add

Year of Chriſt 11454 when the Sun will enter *Aries* upon *Chriſtmas* Day.

How ſtrangely will the Seaſons of the Year be alter'd, to what they are now, if any Perſon were to be alive to ſee it! But if the World endure ſo long, the People then living will not know any Alteration; becauſe this Alteration is made gradually, and by little and little; ſo that in an Age the Vulgar cannot perceive it.

If we examine this Time by the motions of the *Sun* and *Moon*, we ſhall find it too ſhort: However, this will ſerve our purpoſe well enough.

Booker, in his *Tractatus Paſchalis*, Page 5, tells us, that the Chriſtian Church have been always ſtudious and ſolicitous, as, not only the Biſhops, but the Oecumenical or General Councils have diligently preſcribed what time, and Day of the Year, with what Rite, and Ceremonies the Holy Feaſt of *Eaſter* ſhould be Celebrated; that all Controverſies which happen'd concerning the ſame in the Primitive Times, might be removed and taken away: Which was accompliſhed by the Firſt General Council at *Nice*, in the Year after Chriſt 326; the Canons, or Rules of which Council were,

Firſt, That the Equinoctial Day ſhould be obſerved upon the 21*ſt* Day of *March*.

Secondly,

Secondly, That the Full Moon happening upon the 21*ſt* Day of *March*, or the next Day after, ſhould be counted the *Full Moon* of the Month *Niſan* (which is part of our *March* and *April*.)

Thirdly, That the *Sunday* which next followed that ſucceeding *Full Moon*, ſhould be *Eaſter-Day*; but if the 14*th* Day of the *Moon* ſhould happen to be on the *Sunday*, then the next *Sunday* ſhould be *Eaſter-Day*.

And this is the Decree of the ſaid Council of *Nice*; for which there are theſe Reaſons:

Firſt, That there might be ſome Analogy, or Correſpondency between the *Jewiſh* and Chriſtian *Paſcha*, or *Eaſter*; but ſo, that the *Jewiſh* Solemnity might at no time concur with the Chriſtian Memorial of the Reſurrection of Chriſt.

Secondly, That at no time an Eclipſe of the Sun ſhould be ſeen at the Feaſt of *Eaſter*, as that, which was miraculous, at the Death of Chriſt, and, contrary to the Courſe of Nature, happening at the *Full Moon*, leſt it might give occaſion to the *Jews* and Infidels to calumniate the Chriſtians.

Now, becauſe our *Eaſter* can never fall lower than the Twenty ſecond Day of *March*, nor higher than the Twenty fifth Day of *April*, I will here ſubjoin a Table of its Limit, anſwering one Cycle of the *Moon*.

A TABLE

A TABLE *of* Eaſter-Limit.

G.N.	Limit.		G.N.	Limit.	
1	*April*	5	11	*April*	15
2	*March*	25	12	*April*	4
3	*April*	13	13	*March*	24
4	*April*	2	14	*April*	12
5	*March*	22	15	*April*	1
6	*April*	10	16	*March*	21
7	*March*	30	17	*April*	9
8	*April*	18	18	*March*	29
9	*April*	7	19	*April*	17
10	*March*	27			

The Uſe is, Having found the Golden Number for the Year, right againſt it in this Table is *Eaſter-Limit* that ſame Year; and the next *Sunday* following this Limit is *Eaſter-Day* in the *Julian* Account. So this Year 1734, the Golden Number is 6; againſt which is *April* 10, *Eaſter-Limit*; the next *Sunday* after is *April* 14, *Eaſter-Day*, &c.

In the above Diſcourſe, where I have mentioned, that at the General Council they eſtabliſhed the Rule for finding the Holy Feaſt of *Eaſter*; the *Full Moon* there mentioned is not the true time of the ☉ and ☽ s Oppoſition in an Aſtronomical Senſe; but the Day only of the ☽'s mean Oppoſition, which is called the *Eccleſiaſtical Full Moon*, as is expreſſed in our Common Prayer-Book; according to which Rule I have framed this following Table, which, by the help of the Golden Number, and *Roman* Dominical Letter, gives the *Roman Eaſter*. In which Table, all thoſe Days with no Name to them are in *April*.

A TABLE *to find the* Roman Easter.

G. N.	A	B	C	D	E	F	G
1	April 16	Apr. 17	Apr. 18	Apr. 19	Apr. 20	Apr. 14	Apr. 15
2	9	3	4	5	6	7	8
3	Mar. 26	Mar. 27	Mar. 28	Mar. 29	Mar. 30	Mar. 31	Mar. 25
4	April 16	Apr. 17	Apr. 11	Apr. 12	Apr. 13	Apr. 14	Apr. 15
5	2	3	4	5	6	Mar. 31	1
6	23	24	25	19	20	Apr. 21	22
7	9	10	11	12	13	14	15
8	2	3	Mar. 28	Mar. 29	Mar. 30	Mar. 31	1
9	16	17	Apr. 18	Apr. 19	Apr. 20	Apr. 21	22
10	9	10	11	12	6	7	8
11	Mar. 26	Mar. 27	Mar. 28	Mar. 29	Mar. 30	Mar. 31	1
12	April 16	17	Apr. 18	Apr. 19	Apr. 13	Apr. 14	15
13	2	3	4	5	6	7	8
14	Mar. 26	Mar. 27	Mar. 28	Mar. 22	Mar. 23	Mar. 24	Mar. 25
15	April 16	Apr. 10	Apr. 11	Apr. 12	Apr. 13	Apr. 14	15
16	2	3	4	5	6	7	1
17	23	Mar. 24	18	19	20	21	22
18	9	Apr. 10	11	12	13	7	8
19	2	Mar. 27	Mar. 28	Mar. 29	Mar. 30	Mar. 31	1

Note, 7 × 19 = 133, × 4 = 532. That is, 4 × 7 × 19 = 532 = 19 × 28 = 532, the Revolution of *Easter* in both Accounts.

CHAP. XV.

To find by Calculation the Latitudes and Longitudes of all thoſe Places on the Globe, where the principal Appearances of Solar Eclipſes are ſeen.

TO give an Account of the chief *Phænomena* of a Solar Eclipſe, and to deſcribe the Places on the Earth, where they will happen, whilſt the Shadow of the Moon goes along with the Earth,

Let H ⊖ B M repreſent the Globe of the Earth revolving from Weſt to Eaſt by its Diurnal motion upon the Axis P ⊙ ⊖, P being the North Pole; but the South Pole lieth hid, being turned as much from ⊖ on the other ſide from us, as P is on this ſide towards us.

Kirk's Lecture.

Let the Hemiſphere of this Globe, ſeen in the Scheme, be that which is enlighten'd by the Sun; therefore the Sun will directly and perpendicularly ſhine on the Circle H ⊖ B M, whoſe Pole is ⊙.

And this may be truly proved, and repreſented by an artificial Globe, thus:

Mark the Sun's Place in the Ecliptic, and move the *Meridian* in the Horizon till the Sun's Place be in the Zenith. Here ſtay it.

Now all thoſe Places that are above the Horizon are enlighten'd, and thoſe under the Horizon are in Darkneſs.

The upper Part of the *Globe* is here repreſented by the *Circle* H⊖OB, which in Projections of this nature is called the *Horizon of the Eart's enlighten'd Diſk*. And the Bigneſs of this Diſk is to be eſtimated by the Angle under which the Earth is ſeen from the Moon, and is of the ſame Quantity with her Horizontal Parallax. And P ⊙ ⊖ is the Axis of the Globe. It is certain, that it is Noon at every Place of the Earth, when the Earth comes to that half of the Circle P ⊙ ⊖, which is here viſible; becauſe the Sun is in the Plane of it.

A I represents the Way of the Center of the *Moon*'s Penumbra, describing the Tract B *f* H, on the Surface of the Earth. Tho' the Hemisphere of the Earth, which is enlighten'd by the Sun, and consequently has Day, be supposed to be raised up above the Surface of the Scheme; yet the Way A I is conceived to be gone thro' by the Center of the Penumbra, on the Plane of the Disk, upon which the said Hemisphere stands.

Moreover, tho' P ⊙ ☋, L ⊙ Q (the Ecliptic) and N e ☊ be Circles in the said enlighten'd Hemisphere, crossing one another in ⊙, the Point directly under the Sun, they all represent the right Lines upon the Disk of the Earth, directly under those Circles, *viz.* those which are the Orthographical Projection of those Circles, when the Eye is supposed in a distant Point of the Right Line which joyns the Centers of the Earth and Sun.

It is plain, that when the Center of the *Moon*'s Penumbra is come to A (namely, when the penumbrous Circle touches the Earth's Disk at O) the Eclipse of the Sun will begin to an Inhabitant at O. Now he that is at O, by the Diurnal Revolution of the Earth begins to enter the enlighten'd Hemisphere; that is, the Sun rises to him.

Therefore to the Inhabitant of the Earth at O, whom, first of any Inhabitant of the Earth the Penumbra reaches, the rising Sun will first of all appear to be Eclipsed in its upper or Western Limb.

When the Center of the Penumbra it self comes to the Earth at B, an Inhabitant there sees the Rising Sun totally Eclipsed; because he is under the Center of the Penumbra; that is, if the Semidiameter of the *Moon* exceed that of the *Sun*: But if it doth not, it will be a Central Eclipse, and consequently Annular to him.

He that lives at C, sees the Sun Centrally Eclipsed in the Meridian.

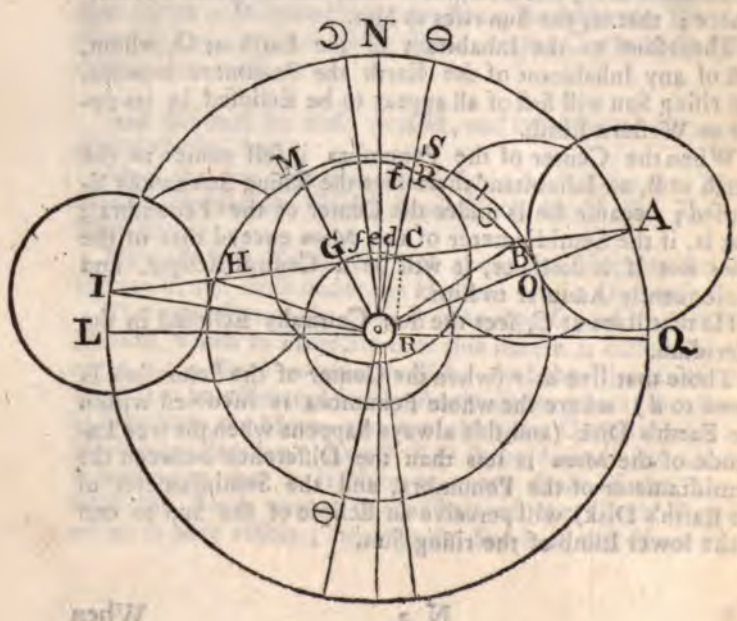
Those that live at *s* (when the Center of the Penumbra is come to *d*) where the whole Penumbra is involved within the Earth's Disk (and this always happens when the true Latitude of the *Moon* is less than the Difference between the Semidiameter of the Penumbra, and the Semidiameter of the Earth's Disk) will perceive an Eclipse of the Sun to end at the lower Limb of the rising Sun.

When the Center of the Penumbra comes to e, the Axis of the Ecliptic, the Sun will be Centrally Eclipſed in the the Nonageſime Degree; and *f*, the Axis of the *Moon*'s Way, is the middle of the Univerſal Eclipſe.

When the Center of the Penumbra comes to G, the Inhabitants of the Earth at M will perceive the Eclipſe of the Sun to begin, as the Sun ſets: For here the Penumbra doth laſt of all touch the Disk, as it is ready to go out of it.

And when the Penumbra is come to H, the End of the Disk, the Spectator, which at that time is at that Point, ſees the ſetting Sun (becauſe being ready to change Day for Night, he goes out of the enlighten'd into the darken'd Hemiſphere) Centrally Eclipſed.

And *Laſtly*, He that, being at I, receives the laſt ſtroke of the *Moon*'s Penumbra, ſees the ſetting Sun as it were contiguous to the *Moon* in its upper Limb, and the End of the Eclipſe, both univerſal and particular every where.



In my *Compleat Syſtem of Aſtronomy*, I have ſhewed how to Calculate the Times and Quantities of a Solar Eclipſe, both for any particular Place on the Globe, and alſo the time of the Ceneral Eclipſe, ſhewing there the time the Penumbra takes up in in its Paſſage over the Earth's Disk; but the Latitudes and Longitudes where thoſe Appearances happen, I have purpoſely omitted, then intending to give a particular Tract by it ſelf; which I ſhall here do in the following manner.

And firſt of all, you muſt carefully obſerve theſe following Preliminaries.

Firſt, By the 17th Precept of my *Compleat Syſtem of Aſtronomy*, you muſt Calculate the Times of the General Eclipſe for the Meridian of *London*, and delineate the Scheme, to ſhew the Paſſage of the Penumbra over the Earth's Disk during the time of the propoſed Eclipſe, that ſo you may have all the Requiſites in readineſs, as you will have occaſion for them in your following Work.

Secondly, If the true Latitude of the *Moon* at the equal Time of the true Conjunction be leſs than the Sum of the Semidiameter of the Earth's Disk and Penumbra, the Sun then will be Eclipſed ſomewhere on the Earth: But if it exceed the Semidiameter of the Earth's Disk, there will be but one Angle of Incidence, and the Eclipſe will not be any where Total.

2. If the true Latitude of the *Moon* be leſs than the Semidiameter of the Earth's Disk, but more than the difference between the Semidiameters of the Earth's Disk and Penumbra, the Eclipſe will then be Central, and there will be two Angles of Incidence.

3. If the true Latitude of the *Moon* be leſs than the difference between the Semidiameters of the Earth's Disk and Penumbra, there will be three Angles of Incidence, and the Eclipſe will be Total, if the Diameter of the *Moon* exceed the Semidiameter of the *Sun*, other ways Annular.

Thirdly, The firſt Angle of Incidence is made at the *Sun* by the Axis of the *Moon*'s Orb, and by a Line drawn from

thence to meet the *Moon*'s Orb in the Center of the Penumbra when it cuts the Circumference of the Circle, that is ſtruck with the Sum of the Semidiameters of the Earth's Disk and Penumbra.

The ſecond Angle of Incidence is made at the Sun, by the Axis of the Moon's Way or Orb, and by a Line drawn from the Sun to the Center of the Penumbra, when it cuts the Earth's Disk.

The third Angle of Incidence is made at the Sun, by the Axis of the Moon's Way, and by a Line drawn from the Sun to meet the Moon's Way in the Center of the Penumbra when it cuts the Perimeter of the Circle that is ſwept with the Difference of the Semidiameters of the Earth's Disk and Penumbra. And theſe are all the Varieties that can happen.

Fourthly, That the Angle Orient, or Altitude of the Nonageſime Degree in Projections for this purpoſe, is the Angle made by the Axis of the Ecliptic, and by a Line drawn from the Sun to any Point in the Earth's Disk, where the Center of the Penumbra touches it at any given time.

And this Angle may be found at all times, by adding or ſubtracting the Angle of the Moon's Way, to, or from the Angles of Incidences ſeverally, as your own Reaſon will ſoon direct, better than a Multitude of Words: For if the Angle of the Moon's Way lie within the Angle of Incidence, then you muſt ſubtract; but if it lie without, you muſt add.

And by this Diſcovery which I have made in the *Keplerian* Method, you have not any occaſion to find the Latitude of the *Moon*, except when the Center of the Penumbra is either in the Nonageſime Degree, or Centrally Eclipſed in the Meridian; and then make the Semidiameter of the Disk the Radius of a Line of Sines on the Sector; then will ⊙ e in all the univerſal Schemes be the Co-Sine of the Altitude of the Nonageſime Degree or Angle Orient; and ⊙ c the Co-Sines of the Angle Orient, when the Center of the Penumbra is upon the Earth's Axis; which two Analogies you will find in their proper places.

Fifthly, The Amplitude of the Path is always that Arch in the Horizon of the Disk between, where the Axis of the Globe cuts it, and where a Line drawn from the Sun to the Place where the Center of the Penumbra cuts it; which may be meaſured on the Chords, if you make the Semidiameter

meter of the Earth's Disk the Radius of the Chord of 60° upon the Sector. Where note,

Sixthly, If with the Altitude of the Nonageſime Degree, and the Cuſp of the Aſcendant, you enter the Table of the Angle Orient, where you find them to meet in the Table, is the Latitude of the Place North. But if you cannot find them throughout all the Table, then enter with the oppoſite Degree Aſcending, and you will have the Latitude of the Place South. Except in the Polar Circles, where it is doubtful.

Seventhly, If the Time at *London* be leſs than it is at the Place ſought, then the Place lies to the Eaſt of *London*; but if it be more at *London* than at the Place ſought, then it lies to the Weſt of the Meridian of *London*.

Eighthly, Obſerve in both methods for finding the Difference of Longitude, that you always ſubtract the Right Aſcenſion of the *Medium Cœli* at *London* from the Right Aſcenſion of the *Medium Cœli* at the Place you are ſeeking, and the Remainder is the Difference of Meridians in the *Keplerian* method. From the Eaſt, borrow a Circle, if you cannot ſubtract.

Alſo in the *Flamſtedian* method, ſubtract the time of Sun-riſing, *&c.* at *London*, from the time at the other Place, and the Remainder is the Difference of Meridians to the Eaſt of the Meridian of *London*; but if the Remainder exceed a Semicircle, or 180°, then deduct 180° from it, and the Remainder is the Longitude Weſt of *London*.

To the Sun-riſing always add 12 Hours, and to the time of Sun-ſetting borrow 24 Hours, if Subtraction cannot be made.

Ninthly, When you find the Latitude of the Place by the *Keplerian* method, the Angle Orient is found, as I have directed in the Fourth hereof, except when the Center of the Penumbra is upon the Earth's Axis; and then it muſt be done, as you will find in their proper Places.

But at any other time, if you would prove my Method of finding the Angle Orient, as ſhewn in the Fourth hereof; then when the Center of the Penumbra is at A or I, ⊙ A = ⊙ I muſt be made Radius, by ſaying,

As the Sum of the Semidiameter of the Earth's Disk and Penumbra = ⊙ A = ⊙ I,
Is to the Radius;
So is the *Moon*'s Latitude,
To the Co Sine of the Angle Orient, or Altitude of the Nonageſime Degree.

When the Center of the Penumbra is at B or H, then ⊙ B = ⊙ H muſt be made Radius. And when the Center of the Penumbra is at *d* or G (in Figure 1.) then ⊙ *d* = ⊙ G muſt be made Radius; that is,

As the Difference between the Semidiameter of the Penumbra and Earth's Disk,
Is to the Radius;
So is the *Moon*'s Latitude at *d* or G,
To the Co Sine of the Angle Orient at that Place.

Example. In the Sun's Eclipſe, *July* the 4*th*, 1730, in the Scheme, Page 180, the *Angle* *e* ⊙ *d* = 3° 29′ = *Angle* Orient; then ſuppoſe a Perpendicular let fall from *d*, and it will be parallel to ⊙ *e*; therefore the Angle formed thereby at *d* = to the Angle *e* ⊙ *d* 3° 29′, and the Side ⊙ *d* is known to be = to the Difference between the Semidiameter of the Earth's Disk and Penumbra 23′ 7″.

Now, for the *Moon*'s Latitude when at *d*, ſay,

	° ′	
As Radius	90 00	10.000000
To ⊙ *d*	1387	3.142076
So C.S. ∠ at *d*	3 29	9.999197
To Lat. ☽	1384	3.141273 = 23′ 4″.

Then for the Angle Orient,

As Semidiameter X = ⊙ *d*		1387″	3.141076
To Radius	—	90′ 00″	10.000000
So ☽ Lat. at *d*		1384	3.141136
To C.S. ∠ Orient		3 29	9.999060

Laſtly, In the *Keplerian* Method, the Latitude of the Place is known to be North or South, by the Table of the Angle Orient, as directed in the Sixth hereof: But when the Latitude falls within the Polar Circles, it is doubtful.

But

But in the *Flamſteedian* Method, the Place is known to be in North or South Latitude by that of the Amplitude of the Path.

For if the Amplitude of the Path, be leſs than 90°, the Latitude of the Place is of the ſame Name with the *Moon*'s Latitude; but if more than 90°, 'tis of a contrary Name.

If the Latitude of the *Moon* exceed the Semidiameter of the Earth's Disk, the *Sun* will not be then Centrally Eclipſed, neither on the Meridian, nor in the Nonageſime Degree. Witneſs the Sun's Eclipſe, *June* 11, 1732.

Tenthly, Theſe things being well underſtood; and alſo ſuppoſing the Reader to be well acquainted with my *Compleat Syſtem of Aſtronomy*, he may now proceed to the matter in hand: And for an Example, I ſhall now begin with the Eclipſe of the Sun that happen'd the 4th Day of *July* 1730, under the Meridian of *London*, from my Tables of Sir *Iſaac Newton*'s *Theory of the Moon*.

The Time of the the true *Conjunction* of the *Sun* and *Moon*, according to the Tables in my *Satellite Astronomy*, stands thus:

Eq. Time tr. ☌.		Longit. ☉. ′ ° ′ ″	Anom. ☉. S. ° ′ ″	*Hourly Mot. of* ′ ″
Anno 1730		9 20 42 12	6 12 27 14	☽ 29 43
July	3	6 01 21 32	6 1 21 1	☉ 2 22
Hours	16	39 25	39 25	☽ à ☉ 27 21
Minutes	59	2 25	2 25	
Seconds	40	2	2	
Mean Motion		3 22 45 36	0 14 30 7	
Equation sub.		0 28 33		
Sun's tru. Place		3 22 17 03		

Eq. Time tr. ☌		Longit. ☽.	Apog. ☽.	Node ☽.
Anno 1730		6 19 42 42	2 18 21 10	10 6 29 16
July	3	8 24 27 24	20 29 57	9 44 37
Hours	16	8 47 03	4 27	2 7
Minutes	59	32 24	16	8
Seconds	40	22	3 8 55 50	— 9 46 52
Mean Motion		3 23 29 55	— 4 54	9 26 42 24
1 Equat. add		2 52	3 8 50 56	+ 2 20
Moon Equated		3 23 29 55	3 ☉ 22 17 3	9 — 26 44 44
2 Equat. sub.		1 37	0 13 26 7	3 ☉ 22 17 3
Moon Equated		3 23 31 10	0 26 52 14	5 25 32 19
3 Equat. sub.		7	+ 4 37 38	10 21 4 38
Moon Equated		3 23 31 03	3 13 28 34	— 0 13 33
4 Equat. sub.		1 14 00	3 ☽ 23 31 3	9 26 31 11
☽ in her Orb		3 22 17 03	0 10 2 29	
Node sub.		9 26 31 11	0½ = 5 1 14½	
Arg. Lat.		5 25 45 52	Eccentricity--	—— 65727
Tr. Lt. ☽ N.D.		22 49	Mean Anom.	0 10 2 29
Reduct. add		1 4	Inclin. of Lim	-it 17 41
Ecliptic Place		3 22 18 7	Simple Latit.	—— 21 44
			Increment —	1 5

	′ ″		′ ″
As H. Mot. ☽ à ☉	27 21 LL 34 12	Excess	0 7
To 1 Hour, or	60 0 0	Proportional Part add	1 5
So Reduc. add	1 4 17501	True Latitude N.D.	22 49
To Time Red. sub.	2 21 14099		

The Requiſites being found according to that Book, muſt be ſet down thus:

	d.	h.	′	″
Equal Time true ☌ at *London* 1730, *July*	3	16	59	40
Equation of Time ſub. —			5	16
Apparent Time in the Moon's Orb	3	16	54	24
Time of Reduction ſub. and add			2	21
Apparent Time ☌ Ecliptic Conjunction		16	52	3
of the ☾ Middle —		16	56	45
True Latitude of the Moon N. D.			22	49
Diff. Horiz. Parallax of ☉ and ☽ = Semid. ☾'s Disk			53	49
Semidiameter of the Sun — —			15	31
Semidiameter of the Moon — —			14	51
Sum is Semid. of the Penumbra, add and ſub.			30	42
Sum of the Semid. of the Earth's Disk and Penumb.			84	31
Difference — — —			23	7

Here the Sum being more than the Moon's Latitude, proves an Eclipſe; and the Difference being more than the Moon's Latitude, proves, the Penumbra will all fall within the Earth's Disk, and that there are three Angles of Incidence.

	°	′	″
Angle of ☽'s Orb with the Ecliptic = *e* ☉ *f*	5	45	0
Sun's Declination North	21	38	0
Inclin. Axis Earth, and Axis Ecliptic = ∠ *s* ☉ *c*	9	22	0
First ∠ of Incidence = *f* ☉ A = *f* ☾ I	74	20	0
Motion of half Duration = A *f* = *f* I — 4885″		81	23
Time of half Duration ſub. and add		2	58	38
Second ∠ of Incidence = *f* ☉ B = *f* ☉ H	64	55	0
Motion of half Duration of Centr Ecl. = B*f* = *f* H		48	44
Time of half Duration Centr. Ecliptic ſub. and add	1	46	56
Third ∠ of Incidence = *f* ☉ *d* — *f* ☉ G	9	14	0
Motion from *d* to *f* = 223″		5	43
The Time ſub. and add —		8	9
Angle of Direction = ∠ *f* ☉ C	15	7	0
Diſtance in the Earth's *Axis* = ☉ C 1418″		23	38
Motion from C to *f* 370		6	10
Time the Penumbra is paſſing from C to *f* ſub.		13	32
Diſt. of Center of Penumbra in *Axis* of Ecl. = ☉ *e* 1375″		22	56
Motion from *e* to *f* 109″		1	49
Time the Penumbra is moving from *e* to *f* ſub.		3	59

Now,

Now, by *Precept* 17, *Page* 411, of my *Compleat Syſtem of Aſtronomy*, project the Diagram as in Page 180.

The outermoſt Circle is drawn with the Sum of the Disk and Penumbra; the next, with the Semidiameter of the *Earth*'s Disk; and the innermoſt, with the Difference of the *Penumbra* and Disk, all upon the Center ⊙.

Note, The Elevation of the Pole above the Plane of the Disk is always equal to the Declination of the Sun.

This you may prove by a Globe: For, bring the Sun's Place into the Zenith, and then the enlighten'd Pole will be juſt ſo much elevated as is the Sun's Declination.

Now, according to the Doctrine of my fore-cited Book, I have found at *London*, when the

	D.	h.	′	″
Eclipſe firſt begins at Sun-riſing L 1730, *July*	3	13	58	07
Central Eclipſe begins at B		15	9	49
Meridional Sun Centrally Eclipſed C		16	43	13
Eclipſe ends at Sun-riſing *t*		16	48	36
Nonageſime Sun Centrally Eclipſed e		16	52	3
Middle of the Eclipſe *f*		16	56	45
Eclipſe begins at Sun ſetting M		17	4	54
Central Eclipſe ends H at Sun-ſetting		18	43	41
End of the Eclipſe at O Sun-ſetting		19	55	23
After the Penumbra has continu'd in paſſing over the Earth,		5	57	16

---

1. To find the Place O on the Globe, where the Sun is ſeen to begin to be Eclipſed at his Riſing: The Center of the Penumbra is then at A.

1. By the *Keplerian* Method.

OPE

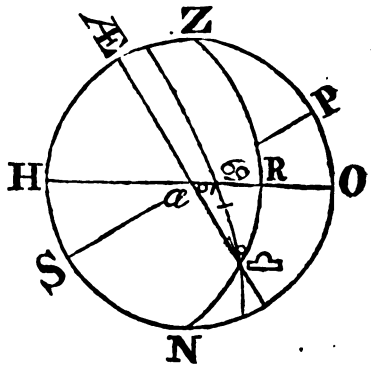
OPERATION.

	D.	h.	′	″
Apparent Time at *London* when the Penumbra firſt touches the Disk,	3	13	58	7
Equation of Time add — —			5	16
Equal Time — —	3	14	3	23
Sun's Place then by my Tables	♋	22	10	3
Sun's Right Aſcenſion —		113	57	0
Apparent Time from Noon add		209	31	45
Sum, is the Right Aſcenſion Mid-Heaven		323	28	45
Sun's Declination North		21	39	0

For the Angle Orient.

Firſt Angle of Incidence = L ⊙ *f*	74	20	0
Angle of the *Moon*'s Way = *f* ⊙ e ſub.	5	45	0
Remains Angle Orient = L ⊙ e	68	35	0

Enter the Table at the End hereof with the Sun's Place ♋ 22° 10′ 3″; for it is the Cuſp of the Aſcendant; and ſeek in the ſame Line you find the Altitude of the Nonageſime Degree, which is the ſame with the Angle Orient 68° 35′, and it will give the Latitude of the Place North 28° 22′: Or, by Trigonometrical Calculation, in the adjacent Diagram, Æ ♎, is the Equinoctial, ♋ ♎, a Part of the Ecliptic, R ♎ is a Perpendicular let fall upon the Angular Point, and cutting the Horizon at Right Angles.



	°	′	
As *C.t.* ∠ ♑ ♋ R Orient	68	35	9.593542
To Radius	90	00	10.000000
So *C.S.* ♋ ♑ Longitude	67	50	9.576689
To *C.t.* ∠ ♋ ♑ R	46	7	9.983147
Add ∠ ♈ ♑ ♋	23	29	
Z = ∠ ♈ ♑ R	69	36	
As S. ∠ ♋ ♑ R	46	7 Co Ar.	0.142254
To S. ∠ ♈ ♑ R	69	36	9.971871
So *C.S.* ∠ ♑ ♋ R ∠ Orient	68	35	9.562468
To S. Lat. North	28	22	9.676553

Note, This laſt Analogy gives the Co Sine of the Angle ♑ ♈ R, which is the Elevation of the Equator. Therefore becauſe the Co Sine of the Co Sine is equal to the Sine, I ſhall in the following Work always ſay, To the Sine of the Latitude.

For the Difference of Longitude.

	°	′	
As Radius —	90	00	10.000000
To *t.* Latitude North	28	22	9.732251
So *t.* ☉ Declination North	21	39	9.598722
To S. Aſc. Diff. ſub.	12	23	9.330973
Sun's Right Aſcenſion	113	57	
Rem. Ob. Aſc. Aſcend.	101	34	
Sub.	90	00	
Rem. R. A. *M. Cœli*	11	34	00″ + 360°
R. A. M.C. at *London*	323	28	45
Diff. Long. to the Eaſt	48	5	15 of *London*.

Which Place falls, upon the Globe, near the Weſt End of the *Perſian* Gulf.

2. By the *Flamſteedian* Method.

OPE-

OPERATION.

First Angle of Incidence L ⊙ *f*	74° 20′
Angle of Direction *f* ⊙ C ſub.	15 7
Amplitude of the Path C ⊙ L	59 13

		° ′	
As Radius — —		90 00	10.000000
To C.S. Sun's Declin. North		21 39	9.968228
So C.S. Amplitude of the Path		59 13	9.709094
To S. Lat. of the Place North		28 24	9.677322

Fig. 1. *Note*, Draw the *Arch* of the Great Circle PO, and you will have the Right-angled Spheric Triangle PSO, in which are given SO, the Amplitude of the Path 59° 13′, the Sun's Declination (for P⊙ is the Sun's Diſtance from the Pole) to find PO, the Complement of the Latitude; and therefore becauſe a Co Sine falls upon a Co Sine, in all the following Work I always ſay, To the Sine of the Latitude of the Place.

For the Difference of *Meridians*.

		° ′ ″
Æſt. Diff. 12° 23′ reduc'd into Time, is		49 32
From — —		6 0 0
True Time of Sun-riſing		5 10 28
Time then at *London* ſub.		1 58 7
Rem. Difference of Meridians Eaſt	3 12 21	=48° 5′ 15″

2. To find the Place B on the Globe, where the Sun is Centrally Eclipſed.

1. By the *Keplerian* Method.

OPE-

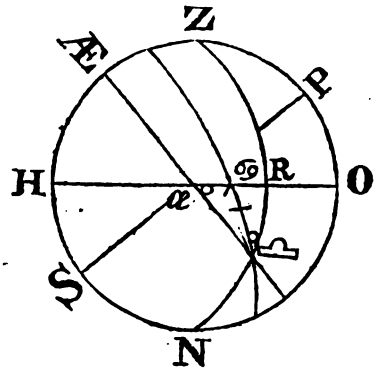
OPERATION.

	D.	h.	′	″
Apparent Time at *London* when the Central Eclipſe begins	3	15	9	4
Equation of Time add			5	1
Equal Time — —	3	15	15	
Sun's true Place — —	♋	22	12	2
Sun's Right Aſcenſion —		113	59	
Apparent Time from Noon add		227	27	1
Sum is the Right Aſceoſion *Med. Cœli*		341	26	1
Sun's Declination North		21	39	

For the *Angle* Orient.

	°	′
Second *Angle* of Incidence = *f* ⊙ B	64	55
Angle of the *Moon*'s Way *f* ☾ e ſub.	5	45
Rem. the *Angle* Orient	59	10

With this, and the Sun's Place in the Aſcendant, ♋ 2 Degrees, 12 Minutes, 2 Seconds. Enter the Table of the Angle Orient and where you find them both to meet, with on the Head of the Table be the Latitude of the Place North 36 Degrees, 50 Minutes.



Or

Or, by Calculation,

		° ′	
As Ca. ∠ ♎ ☋ R ∠ Orient		59 10	9.775908
To Radius	—	90 00	10.000000
So C.s. ☋ ♎	——	67 48	9.577309
To C.t. ☋ ♎ R		57 40	9.801401
Add ∠ ♌ ♎ ☋		23·29	
Z = ∠ ♌ ♎ R		81 9	
As S. ∠ ☋ ♎ R		57 40	Co Ar. 0.073169
To S. ∠ ♌ ♎ R		81 9	9.994798
So C. S. ∠ ♎ ☋ R		59 10	9.709730
To S. Latitude North		36 50	9.777697

For the Difference of Longitude.

	° ′	
As Radius	90 00	10.000000
To t. of Latit. North	36 50	9.874481
So t. ☉ Declin. North	21 39	9.598722
To S. Aſc. Diff.	17 18	9.473203
Sun's R. Aſcenſion	113 59	
Rem. Ob. Aſc. Aſcend.	96 41	
Snb.	90 0	
Rem. R.A. M.C.	6 41 0	+ 360°
Ri. A. M.C. at *London*	341 26 15	ſub.
Diff. Longit. Eaſt	25 14 45	of *London*.

2. By the *Hamſteedian* Method.

OPERATION.

	° ′
Second Angle of Incidence = *f* ⊙ B	64 55
Angle of Direction = *f* ⊙ C ſub.	15 7
Rem. Amplitude of the Path = ∠ S ⊙ B	49 48

Now, if from P you draw a great Circle to B, that it be the Diſtance of the Zenith of the Place from the Pole; and to find it, you have given as before,

Then ſay,

	° ′	
As Radius	90 00	10.000000
To *Co S.* ☉ Declination	21 39	9.968218
So *Co S.* Amplitude of the Path	49 48	9.809868
To S. Latitude of the Place North	56 52	9.778096

For the Difference of Meridians.

	° ′	h.	′	″	
Aſcenſional Diff.	17 18 reduc'd into Time is	1	9	12	ſub.
From	— —	6	0	0	
True Time Sun-riſing is		4	50	48	
Time then at *London* ſub.		3	9	49	
Difference of Meridians Eaſt		1	40	59	

Which reduc'd into Degrees, are 25° 14′ 45″, as before. Which Place falls on the Globe near the Eaſtern *Coaſt* of the Iſle of *Candia* in the Mediterranean Sea.

---

3. To find the Place *C* on the Globe, where the Sun is *Centrally* Eclipſed in the Meridian.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1730, *July*	3	16	43	13
Equation of Time add —			5	16
Equal Time — —	3	16	48	29
Sun's Place then —	♋	22	16	36
Sun's Right Aſcenſion — —		114	5	0
Apparent Time from Noon add		250	48	15
Sum is the R.A. M. *Cæli* at *London*		4	53	15
Sun's Declination North		21	38	0

Now, before we can find the Latitude of the Place, we muſt find the neareſt Diſtance of the Center of the Penumbra

bra on the Axis of the Globe to the Ecliptic, which is the ſame with the Moon's Latitude then, = R C.

Therefore in Figure 1, let fall the Perpendicular c R; and becauſe it is parallel to c ☉. the Angle ☉ c R is known to be equal to the Angle c ☉ c, the Inclination of the two *Axes* 9° 22', and the Diſtance in the *Axis* of the Globe. ☉ c is known 1418", to find c R the Moon's Latitude.

		° ′	
As Radius	—	90 00	10.000000
To the Diſtance in the *Axis* = ☉ c		1418	3.151676
So C.S. ∠ ☉ c R		9 22	9.994178
To c R, the Moon's Latitude		1399	3.145847

Now for the Altitude of the Nonageſime Degree.

As Semidiameter of *Earth*'s Diſk = ☉ B		3229	3.509068
To Radius	— —	90° 00′	10.000000
So Moon's Latitude = c R		1399	3.145847
To C.S. Altit. Nonageſime Degree		64 19	9.636779

Make ☉ R the Radius of a Line of Sines on the Sector, and take c R in your Compaſſes, and apply it to the Line of Sines, ſhall give the Sine-Complement of the Angle Orient, or Altitude of the Nonageſime Degree, which in this caſe is 25° 41', whoſe Complement is 64° 19', the Altitude of the Nonageſime Degree ſought, and is the ſame with the Calculation.

Now, you are to obſerve, that the Place of the Sun at the given time, is alſo the Cuſp of the *Medium Cœli*; becauſe he is now upon the Meridian of the enquired Place: Therefore his *Right Aſcenſion* 114° 5', is alſo the *Right Aſcenſion* of the Mid-Heaven: To which we muſt find the Meridian *Angle*, by the 29th *Problem* of my *Compleat Syſtem of Aſtronomy*, and by *Problem* 33, the Diſtance of the Sun, or Mid Heaven (which is all one) from the Nonageſime Degree.

Then having found the Nonageſime Degree, add 3 Signs to it, and you will have the Cuſp of the Aſcendant at the place ſought. See all the Work in its Order, as follows.

For the *Meridian Angle* ſay,

		°	′	
As Radius	— —	90	00	10.000000
To S. Obliquity of the Ecliptic		23	29	9.600409
So C.S. *M.C.* = ☉ R. A.		65	55	9.610729
To C.S. *Meridian Angle*		80	39	9.211138

For Diſt. Mid-Heaven from Nonageſime Degree.

As Radius	— —	90	00	10.000000
To C.*t.* Altit. Nongeſ. Degree		64	19	9.682063
So C.*t. Meridian Angle*		80	39	9.216568
To S. Diſt. *M.C.* à Nonag. Degr.		4	33	8.898631

Now *note*, If ♋ ♌ ♍ ♎ ♏ ♐ ſub.
the Sun be in ♑ ♒ ♓ ♈ ♉ ♊ add

This Diſtance thus found to, or from, the Sun's Place, gives the Nonageſime Degree at the Place required.

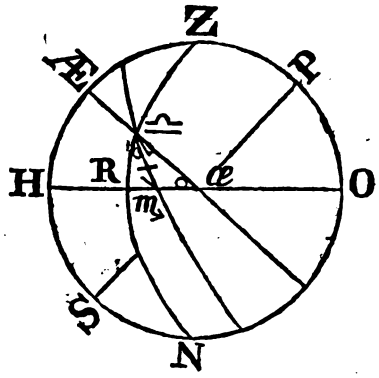
OPERATION.

		°	′	″
Sun in the Mid-Heaven		♌ 22	16	36
Diſt. of it from the Nonageſime Degr. ſub.		4	33	00
Nonageſime Degree		3 17	43	36
Add	---- ----	3	00	00 00
Cuſp of the *Aſcendant* at the Place ſought		6 17	43	36

Now, for the Latitude of that Place.

		°	′	
As C.*t.* ∠ R ♏ ♎ ∠ Orient		64	19	9.682063
To Radius		90	00	10.000000
So C.S. ♎ ♏		17	44	9.978858
To C.*t.* ∠ R ♎ ♏		26	48	10.296795
		°	′	
Angle R ♎ ♏		26	48	
Angle ♏ ♎ ♈ +		23	29	
Angle R ♎ ♈		50	17	

As



	°	′		
As S ∠ R ♎ ♏	26	48	Co Ar.	0.345941
To S. ∠ R ♎ ♐	50	17		9.886047
So C. S. ∠ R ♏ ♎	64	19		9.636886
To S. Latitude North	47	40		9.868874

But if the Latitude of the Place be South, and the Sun in ☋ ♋ ♌ ♍ ♎ ♏ ♐ add ☽ the Diſtance of the Sun in the ☊ ♑ ♒ ♓ ♈ ♉ ♊ ſub. ☋ Meridian, from the Nonageſime Degree, to, or from the Sun's Place, gives the Place of the Nonageſime Degree.

For the Longitude of that Place.

	°	′	″	
R.A. *M.C.*	114	5	0	= to the Sun's R. A.
Right Aſc. *M.C.*	4	53	15	at *London*.
Diff. Longit.	109	11	45	to the Eaſt of *London*.

2. By the *Flamſteedian* Method.

OPERATION.

As the Semidiameter of ☉'s Disk	3229″	3.509068
To Radius — —	90° 00′	10.000000
So Diſt. in the *Earth*'s Axis	1418	3.151697
To S. Diſt. ⊙ in Merid. à Vertex	26 3	9.642629
Sun's Declination add	21 38	
Sum is the Latitude of the Place	47 41 North.	

For the Difference of Meridians.

	h.	′	″
The Time is there Noon ♎	24	00	00
Time at *London* ſub.	16	43	13
Difference of Meridians	7	16	47

Which reduced, is 109° 11′ 45″ to the Eaſt of *London*. This Place falls on the Globe in *Great Tartary*.

4. To find the Place *d* on the Globe; that is, where the Center of the *Penumbra* is, when thoſe that live at *t*, ſee the Eclipſe end at Sun-riſing.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, *July*	3	16	48	36
Equation of Time add			5	16
Equal Time —		16	53	52
Sun's Place then by my Tables	♋	22	16	50
Sun's Right Aſcenſion		114	5	00

Apparent

	h.	°	′
Apparent Time from Noon add	252	9	00
Sun, is the R. A. *M. Cæli*	6	14	00
Sun's Declination North	21	38	00

For the Angle Orient.

	°	′
Third Angle of Incidence = *f* ⊙ *d*	0	14
Angle of the Moon's Way *f* ⊙ *e* ſub.	5	45
Remains ∠ Orient = *e* ☊ *d*	3	59

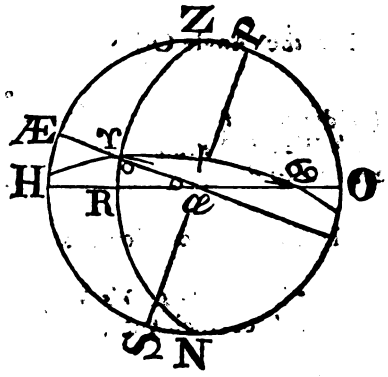
Or thus, for its Complement.

From the ∠ R ⊙ *f*, that is, 90° + ∠ ☽'s Way	95	45
Sub. the ∠ *f* ⊙ *d* the 3*d* ∠ of Incidence,	9	14
Remains the ∠ R ⊙ *d*	86	31

Now, with the Sun's Place *Cancer* 22° 16′ 50″, being the Cuſp of the Aſcendant, and the Angle Orient 3° 29′ enter the following Tables: But becauſe they cannot be found to anſwer therein, is a proof that the Latitude of the Place is within the Artic Circle.

Or, by Trigonometrical Calculation.

OPERATION. A doubtful Case.



	o ′	
As C.s. ∠ R ♋ ♈ ∠ Orient	3 29	11.215592
To Radius	90 00	10.000000
So C.S. ♈ ♋ Longitude	67 43	9.578853
To C.s. ∠ R ♈ ♋ sub.	88 41	8.363261
From	180 00	
∠ R ♈ ♋	91 19	
Sub. ∠ œ ♈ ♋	23 29	
= ∠ R ♈ œ	67 50	

As S. R. ♈ ♋	88 41	Co Ar.	0.000115
To S. ∠ R, ♈ œ	67 50		9.966653
So C.S. ∠ R ♋ ♈ ∠ Orient	3 29		9.999197
To S. Lat. North	67 37		9.965965

Now say,

	o ′	
As Radius	90 00	10.000000
To S. Lat. North	67 37	10.385282
So S. ☉ Decl. North	21 38	9.598354
To S. A. Differ.	74 22	9.983636

For

For the Difference of Longitude.

Sun's Right Aſcenſion	114	5	
Aſcen. Difference ſub.	74	22	
X Ob. *Aſcen. Aſcendant*	39	43	+ 360° = 399° 43′
Sub.	90	00	
Rem. *R A. M.C.*	309	43	
R.A. M. Cæli at *London* ſub.	6	14	
Diff. Longit. Eaſt of *London*	303	29	Weſt 56° 31′

2. By the *Flamſteedian* Method.

OPERATION.

Angle of Direction = *f* ⊙ *c*	15	7
Third Angle of Incidence = *f* ⊙ *d*	9	14 ſub.
Amplitude of the Path = *t s*	5	53

As Radius —	90	00	10.000000
To C.S. Sun's Declination	21	38	9.968278
So C.S. Amplitude of the Path	5	53	9.997706
To S. Latitude North	67	37	9.963984

For the Difference of Meridians.

	h	′	″	
Aſc. Diff. 74° 22′ in Time is	4	57	28	ſub.
From —	6	00	00	
Sun riſes at	13	2	32	+ 24 hours.
Time at *London*	16	48	36	
Rem. Diff. Meridians Eaſt	20	13	56	

Which reduced into Degrees, are 303° 29′: Which Place falls on the Globe in the unknown North Sea beyond *Hudſon's Bay*. This is the moſt Weſterly of all where the Eclipſe is ſeen.

5. To find the place *e* on the Globe where the Sun is Centrally Eclipſed in the Nonageſime Degree,

1. By the *Keplerian* Method.

OPERATION.

	d.	°	′	″
Apparent Time at *London*, 1730, *July*	3	16	52	3
Equation of Time add			5	16
Equal Time ---	3	16	57	19
Sun's place then ♋	☌	22	16	57
Sun's *Right Aſcenſion* —		114	5	0
Apparent Time from Noon add		253	0	45
Sum is the *R. A. M. Cæli* at *London*		7	5	45
Sun's Declination North		21	38	0
☽'s Lat. = Diſt. in *Axis* Ecl. ☉ *e* nearly 1376″			22	56

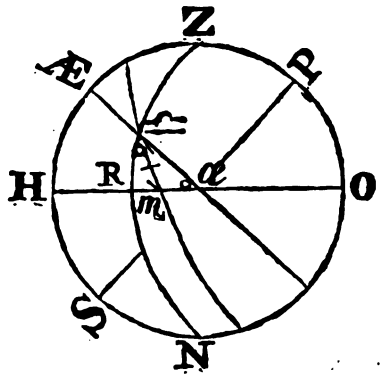
Now ſay,

As the Semid. of ☉'s Diſk	3229′′			3.509068
To Radius ---	90°	00′		10.000000
So Moon's Lat. = ☉ *e*	1376			3.138618
To C.S. Alt. Nonageſ. Degr.	64	47		9.629550
Sun's Place = Alt. Nonag.	3♋	22	16	57′′
Add	3	00	00	00
Sum, is Cuſp of Aſcend.	6	22	16	57

With this Aſcendant *Libra* 22° 16′ 57″, and the Angle Orient enter the Table following, and they will give the Latitude of the place North 46° 25′.

Or,

Or, by Calculation.



	° ′	
As C.t. ∠ R ♏ ♎ Orient	64 47	9.672947
To Radius	90 00	10.000000
So C.S. ♎ ♏ Longitude	22 17	9.966292
To C t. ∟ R ♎ ♏	26 58	10.293345
Add ∟ R ♏ ♎ ♌	23 29	
Z ∟ R ♓ ♌	50 27	

	° ′		
As S. ∟ R ♌ ♓	26 58	Co Ar.	0.343449
To S. ∟ R ♓ ♑	50 27		9.887093
So C.S. ∟ R ♏ ♎	64 47		9.629453
To S. Latitude Nor.	46 25		9.859995

Now you muſt find the Declination of the Cuſp of the Aſcendant.

	° ′	
As Radius —	90 00	10.000000
To S. Obliquity	23 29	9.600409
So S. Longitude in *Libra*	22 17	9.578853
To S. Declination South	8 41	9.179262

For

For the Right Aſcenſion of the Aſcendant.

	°	′	
As Radius —	90	00	10.000000
To *C. S.* Obliquity	23	29	9.962453
So t. Longitude in *Libra*	22	17	9.612561
To *t.* R. A. à *Libra*	20	36	9.575014
	180	00	
	200	36	*R. A.* Aſcendant.

For the Aſcenſional Difference.

	9	′		
As Radius	90	00		10.000000
To *t.* Latitude North	46	25		10.021485
So *t.* Declinat. South	8	41		9.183907
To S. Aſcen. Diff.	9	14		9.205392
R.A. of Aſcend. add	200	36		
♎ Obl. Aſc. Aſcendant	209	50		
Sub.	90	00		
R. Aſc. *Med. Cœli*	119	50		
R. Aſcen. at *London*	7	5	45″	
Diff. Long. Eaſt of *London*	112	44	15	

2. By the *Flamſtedian* Method.

The Fourth *Arch* muſt be taken from the Sun's Diſtance from the ſame Pole that the Moon is next unto; *i. e.* If the Moon hath North Latitude, take it from the Sun's Diſtance from the North Pole: If the Moon hath South Latitude, take it from the Sun's Diſtance from the South Pole; and the Remainder is the Fifth *Arch.*

OPERATION.

As Semid. of the Earth's Diſk	3229″		3.509058
To Radius —	90	00	10.000000
So Diſt. ☉ *e* in *Axis* of Ecliptic	1376		3.138618
To S. Azim. between ☉ & *Vertex*	25	13	9.629550

♏ Compl. 64° 47′ is the Altit. Nonageſ.

Note,

Note, If the Diſtance of ⊙ from the *Vertex* be leſs than the ⊙'s Declination North, then the ⊙ is to the North; otherwiſe, to the South of the *Vertex*.

		° ′	
As Radius	—	90 00	10.000000
To *C.S.* Inclin. Axis Globe and Axis Eclip:		9 22	9.994171
So *s.* ⊙ Diſt. à *Vertex* in the Nonageſſ.		25 13	9.672947
To *s.* of the Fourth Arch ſub.		24 55	9.667118
Sun's Diſt. from the North Pole		68 22	
Remains the Fifth Arch		43 27	

Now ſay,

As *C. S.* the Fourth Arch	24 55	Co Ar.	0.042429
To *C. S* the Fifth	43 27		9.860921
So *C.S.* ⊙ Diſt. a *Vertex*	25 13		9.936506
To S. Lat. North	46 24		9.859856

For the Difference of *Meridians*.

		° ′	
As *S.* Fifth Arch	—	43 27	Co Ar. 0.162588
To *S.* the Fourth		24 55	9.624191
So *s.* Inclin. of the two *Axes*		9 22	9.217356
To *s.* Hour à *Noon* when ⊙ in *Nonag.*		5 46	9.004535

Given Time is 6 h. 52′ 3″, Complement = 7 h. 7′ 57″, reduced into Degrees, are 106° 59′ 15″; added to the Hour from Noon in the Nonageſime Degree 5° 46′, makes 112° 45′ 05″; which is the Difference of Longitude to the Eaſt of *London*; which Place falls on the Globe in *Great Tartary*.

6. To find the Place M on the Globe, where the Eclipſe is ſeen to begin at Sun-ſetting, and the Center of the Penumbra is then at G.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, 1730, *July*	3	17	4	54
Equation of Time add			5	16
Equal Time — —	3	17	10	10
Sun's Place then	♋	22	17	28
Sun's Right Aſcenſion —		114	6	0
Apparent Time from Noon add		256	13	30
Sum is the *R. A. M. Cœli* at *London*		10	19	30
Sun's Declination North		21	38	0

For the Angle Orient.

	°	′
Third Angle of Incidence $f \odot G$	9	14
Angle of the Moon's Way add $f \odot e$	5	45
Z, is the Angle Orient $= G \odot e$	14	59

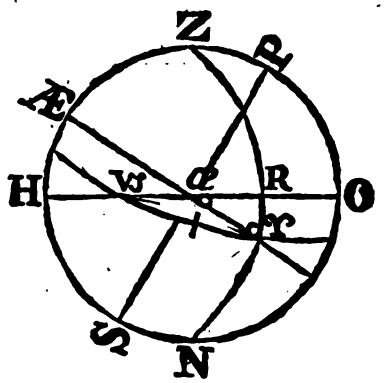
Sun's Place and Setting is ♋ 22° 17′ 28″; therefore the Aſcendant is ♍ 22° 17′ 28″.

Enter the Table of the Angle Orient with 14° 59′, and the Aſcendant ♍ 22° 17′ 28″, and they will give the Latitude of the Place North 57° 53′

Or, by Calculation.

	°	′	
As *C.t.* ∠ ∝ ♍ ♈ ∠ Orient	14	59	10.572453
To Radius —	90	00	10.000000
So *C.s.* ♍ ♈ Longitude	67	43	9.578853
To *C.t.* ∠ ♍ ♈ R	84	12	9.006400
Sub. ∠ ♍ ♈ ∝ Obliquity	23	29	
Remains the ∠ ∝ ♈ R	60	43	

As



	°	′	
As S. ∠ ♈ ♈ R	84	12	Co Ar. 0.002229
To S. ∠ ☌ ♈ ♈ R	60	43	9.940622
So C.S. ∠ ☌ ♈ ♈	14	59	9.984977
To S. Latitude North	57	53	9.927828

For the Difference of Longitude.

	°	′	
As Radius —	90	00	10.000000
To *t.* Latitude North	57	53	10.202248
So *t.* ☉ Declin. North	21	38	9.598354
To *S.* A. Difference	39	11	9.800599
Sun's Right Aſcenſion add	114	6	
Obl. Deſc, Deſcend.	153	17	
Add	90	0	
R. A. *M. Cæli*	243	17	0″
R. A. *M. Cæli* at *London*	10	19	30
Diff. Longit. Eaſt	232	57	30 from *London*

2. By the *Flamſteedian* Method.

OPERATION.

		°	′		
The third Angle of Incidence	*f* ⊙ G	9	14		
Angle of Direction	*e* ⊙ C	15	7		
Z, is the Amplitude of the Path		24	21		
As Radius	—	90	00		10.000000
To Co S. ⊙ Declination		21	38		9.968278
So *C.S.* Amplitude of the Path		24	21		9.959539
To S. Latitude North		57	53		9.927817
Aſcen. Difference in Time is		2	36	44″	
Add	—	6	0	0	
Time of Sun-ſetting		8	36	44	+ 24 Hours.
Time at *London*		17	4	54	
Difference of Meridians		15	31	10	

Which reduced into *Degrees* and *Minutes*, are 232° 57′ 30″ to the Eaſt of *London*, as before.

This is the moſt Eaſterly of all where the Eclipſe was ſeen.

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7. To find the Place on the Globe, where the Sun is Centrally Eclipſed at his Setting; the Center of the Penumbra is then at H.

1 by the *Keplerian* Method.

OPERATION.

		D.	h.	′	″
Apparent Time at *London* 1730, *July*		3	18	43	41
Equation of Time add	—			5	16
Equal Time	—	3	18	48	57
Sun's Place	—	☌	22	21	24
Sun's Right Aſcenſion	—		114	9	0
Apparent Time from Noon add			280	55	15
Sum, is the *Right Aſcenſion M. Cœli* at *London*			35	4	15
Sun's *Declination* North			21	38	0

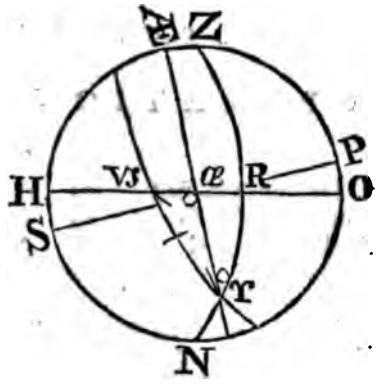
For

For the *Angle* Orient.

	°	′
Second Angle of Incidence H ⊙ *f*	64	55
Angle of the Moon's Way add *f* ⊙ *e*	5	45
Angle Orient = H ⊙ *e*	70	40

With this Angle, and the Sun's oppoſite Place ♎ 22° 21′ 24″ (it being now the Cuſp of the Aſcendant, becauſe the Sun is ſetting) Enter the Table of the Angle Orient, and there you will find the Latitude of the Place 9° 15′ North.

Or, by Calculation.



		°	′	
As C.*s*, ∠ ♈ ♎ ♌ ∠ Orient		70	44	9.545119
To Radius	—	90	00	10.000000
So C.S. ♎ ♈		67	39	9.580084
To C.*s*. ∠ ♎ ♈ R		42	42	10.034965
Sub. ∠ ♎ ♈ ♌ Obliquity		23	29	
Rem. ∠ ♌ ♈ R		19	13	
As S. ∠ ♎ ♈ R		42	42	Co Ar. 0.168668
To S. ∠ ♌ ♈ R		19	13	9.527382
So C.S. ∠ ♈ ♎ ♌		70	42	9.519911
To S. Latitude North		9	15	9.205961

For the Aſcenſional Difference, ſay.

	°	′	
As Radius —	90	00	10.000000
To *t.* Latitude North	9	15	9.211815
So *t.* ☉ Declinat. North	21	38	9.598354
To *S. A. Difference*	3	42	8.810169
Sun's R. Aſcenſion add	114	9	
Obl. Deſc. Deſcendant	117	51	
Add	90	0	
R. A. *M. Cæli*	207	51	0″
R. A. *M. Cæli* at *London*	35	4	15
Diff. Longitude Eaſt	172	46	45

2. By the *Flamſteedian* Method.

OPERATION.

	°	′
Second Angle of Incidence H ☉ *f*	64	55
Angle of Direction add *f* ☉ C	15	7
Amplitude of the Path H ☉ C	80	2

	°	′	
As Radius —	90	00	10.000000
To *C. S.* Sun's Declination	21	38	9.968278
So *C. S.* Amplitude of the Path	80	2	9.238835
To S. Latitude North	9	16	9.207113

For the Difference of Meridians.

	h.	′	″	
The Aſc. Differ. 3° 42′ in Time is	0	14	48	
Add —	6	0	0	
Time Sun's ſetting	6	14	48	+ 24 Hours.
Time at *London* ſub.	18	43	41	
Diff. Meridians Eaſt	11	31	7	

Which reduuced into Degrees and Minutes, are 172° 46′ 45″ Eaſt, as before. This Place falls on the Globe near the Iſles *de los Reys*, Eaſt of the *Philippine* Iſlands.

8. To find the Place on the Globe, where the Sun ſees as the Eclipſe ends The Center of the Penumbra is then at I.

1. By the *Keplerian* Method.

OPERATION.

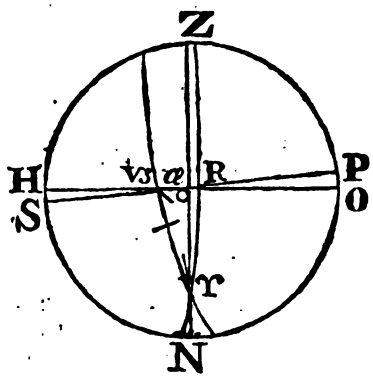
	d.	h.	′	″
Apparent Time at *London*, 1730, *July*	3	19	55	23
Equation of Time add ∽			5	16
Equal Time — —	3	20	0	39
Sun's Place then ∽	♋	22	24	16
Sun's Right Aſcenſion		114	12	0
Apparent time from Noon add		298	50	45
Sum, is the R. A. *M. Cœli* at *London*		53	2	45
Sun's Declination North		21	39	⊕

For the Angle Orient.

	°	″
Firſt Angle of Incidence I ⊙ *f*	74	29
Angle of the Moon's Way *e* ⊙ *f*	5	45
Angle Orient ∽ I ⊙ *e*	80	5

With this Angle, and with the oppoſite Place of the Sun ♋ 22° 24′ 16″, being the Cuſp of the Aſcendant, enter the Table of the *Angle Orient*, and they will give the Latitude of the Place 2° 29′ North.

Or, by Calculation.



	° ′	
As C.s. ∠ ♈ ♋ œ ∠ Orient	80 5	9.242610
To Radius —	90 00	10.000000
So *C.S.* ♋ ♈ Longitude	67 36	9.581001
To *C.s.* ∠ ♋ ♈ R	24 39	10.338391
Sub. ∠ ♋ ♈ œ Obliquity	23 29	
Rem. ∠ œ ♈ R	1 10	
As S. ∠ ♋ ♈ R	24 39	Co Ar. 0.379787
To S. ∠ œ ♈ R	1 10	8.308794
So *C.S.* ∠ ♈ ♋ œ	80 5	9.236073
To S. Latitude North	0 29	7.924654

For the Difference of Longitude.

	° ′	
As Radius	90 00	10.000000
To s. Latitude North	0 29	7.926134
So s. ☉ Declin. North	21 37	9.597985
To S.A. Difference	0 12	7.524119
Sun's R. Aſcen. add	114 12	
Obl. Deſc. Deſcendant	204 24	
Add	90 0	
R. A. *M. Cœli*	204 24 0″	
R. A. M.C. at *London*	53 2 45	
Diff. Longitude Eaſt	151 21 15	

&c.

2. By the *Flamſteedian* Method.

	°	′
Firſt Angle of Incidence O ⊙ *f*	74	20
Angle of Direction *f* ⊙ C	15	07
Sum, is the Amplit. of the Path	89	27

	° ′	
As Radius —	90 00	10.000000
To C.S. ♀ Declination	21 27	9.968328
So C.S. Amplit. of the Path	89 97	7.982233
To S. Latit. of the Place North	0 31	7.950561

For the Difference of Meridians.

	h.	′	″	
The Aſcen. Diff. 12′ in time is	0	0	48	
Add	6	0	0	
Time of Sun-ſetting	6	0	48	+ 24 Hours.
Time at *London* ſub.	19	55	23	
Diff. Meridians to the Eaſt	10	5	25	

Which reduced into Degrees and Minutes, are 151° 21′ 15″. Which Place on the Globe falls to the Eaſt of the *Philippine* Iſlands.

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9. To find the Place on the Globe where the Sun's lower is juſt touch'd by the Moon's upper Limb in the Meridian.

Note, that which is the Sun's upper Limb in North Latitudes, is his lower in Southern Latitudes, and ſo *vice verſa*, So that obſerving by your Calculation the Latitude where the Sun is Centrally Eclipſed in the Meridian, you will eaſily conceive whether a Spectator muſt travel North or South to elevate the Moon above, or depreſs her below the Sun, juſt that their Perimeters may touch each other.

From hence it is plain, that in North Latitudes the North ſide of the Luminaries are their upper ſide, and in South Latitudes the South ſide of the Luminaries are their upper

ſide; that is, having them to the South of you in North Latitudes, and to the North of you in South Latitudes.

And this is what muſt guide you to know (when you have found the diſtance of the *Sun* from the *Vertex* in the Meridian by the following Analogy) when the *Sun* is to the North or to the South of your Zenith.

To which always apply the *Sun*'s Declination at the time he is Centrally Eclipſed in the Meridian, and you will have the Latitude of that Place where the Edges of the *Sun* and *Moon* touch each other at that time.

Or, by obſerving what I have ſaid of my univerſal Projection in Page 77, of Vol. I. of my *Syſtem*, you may eaſily find the Latitude of the Place thereby.

RULE.

To the Semidiameter of the Penumbra add the Diſtance of the Sun in the Earth's Axis from the Center of the Disk; and if that Sum be leſs than the Semidiameter of the Earth's Disk, then it will always hold.

As the Semidiameter of the Earth's Disk in Seconds,
To Radius,
So is the Sum of the Semidiameter of the Penumbra, and Diſtance of the Moon in the Earth's Axis in Seconds,
To the Sine of the Arch of the Meridian between the *Sun* and *Vertex*.

Then by the common known Rules in Navigation, where the Sun's Zenith-Diſtance and Declination are given, to find the Latitude of the Place, Work, and you will have your deſire.

Or, by my Univerſal Projection, if you ſet the Sun's Declination to the Diſtance from the *Vertex*, the two Ends of the Earth's Axis marked *S. P.* and *N. P.* will cut the graduated Meridian in the Latitude of the Place ſought. See my *Syſtem*, Vol. I. Page 77.

But if the Sum of the Semidiameter of the Penumbra, and Diſtance of the Moon in the Earth's Axis exceed the Semidiameter of the Earth's Disk. then the Sun's lower will not touch the Moon's upper Limb in the Meridian any where.

Ex-

Example, in the preſent-nam'd Eclipſe.

OPERATION.

	°	″	
Semidiameter of the Penumbra	30	42	
Diſt. ☽ in ☋ Axis from the Center Diſk	23	38	= ⊙ C add
Sum	54	20	

This exceeding the Semidiameter of the Earth's Diſk 53′ 49″, proves it not to be ſeen any where: For the Sun will be depreſs'd below the Southern Horizon before the Moon's upper Limb touches it, as I ſhall further prove by and by.

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10. To find the Place on the Globe, where the Sun's Upper is juſt touch'd by the Moon's Lower Limb in the Mid-Heaven.

RULE.

In this Caſe you muſt take the Difference between the Semidiameter of the Penumbra, and the Diſtance of the Moon in the Earth's Axis from the Center of the Diſk; and then ſay as in the 9th above.

Example in the preſent named Eclipſe.

OPERATION.

	°	′
Semidiameter of the Penumbra	30	42
Diſt. ☽ in ☋ Axis from Center of the Diſk ſub.	23	38
Difference — —	7	4

Now ſay,

As the Semidiameter of *Earth*'s Diſk	3229″	3.509068
To Radius —	90° 00′	10.000000
So is the Diff. Penumb. and ☽ in ☋'s Axis	424	2.627366
To S. Arch Merid. betw. ☉ & *Vertex* Sou.	7 33	9.118298
Sun's Declination North add	21 38	
Latitude of the Place North	29 11	

And Longitude 109° 9′ 45″ from *London*, being the ſame with that where the Sun is Centrally Eclipſed in the Meridian; which Place (in this Eclipſe) would fall on the Globe near *Tchute* in *China*, if it were conſpicuous; obſerve the following Caution.

The Central Shade enters the Earth on the Eaſtern Coaſt of the Iſle *Candia*, near the Entrance of the *Archipelago* Sea, and bends its Courſe over the North Parts of *Aſia Minor*, and the *Caſpian* Sea, thro' *Great Tartary* and the *Japan* Sea, and from thence into the great Eaſtern Ocean, where it leaves

leaves it about the Iſles *de los Reys*, where the Sun may be ſeen to ſet Centrally Eclipſed; ſo that the *Central Shade* travels Eaſt, as the following Work ſhews.

		° ′ ″
Sun riſes Centrally Eclipſ. in the Longit.		25 13 45 Eaſt.
Sun ſets Centrally Eclipſ. in the Longit.		176 46 45 Eaſt.
Difference in Longitude		151 33 0
Miles in one Degree		69.5
		735
		1323
		882
		10216.5
	Add	33
Engliſh Miles		10249½ the Central Shadow travels Eaſtward.

For the Breadth of the Shade from *North* to *South*.

OPERATION.

	° ′
From a Quadrant	90 0
Sub. Lat. where ☉'s upper is touch'd by ☽'s lower Edge	29 11
Diſt. of that Place from the North Pole	60 49
Sun's Declination North add	21 38
Breadth of the Shadow	82 27
Miles in one Degree	69.5
	410
	738
	492
	5699.0
Add	27
Engliſh Miles	5726

Note,

Note, The 27′ are $\frac{27}{.3}$, which will be reduced to $\frac{28}{69.5}$; but it being so inconsiderable in this case, it matters not whether it is altered or not.

Caution.] *Note*, The Breadth of the shadow 82° 27′, being less than a Quadrant, also proves that the *Sun*'s lower Edge is not any where touched by the *Moon*'s upper in the Meridian: For if you travel Northward beyond the Pole, until you be 82° 27′ distant from the *Sun*, there will be a small Portion of the *Sun*'s lower Limb obscured from your sight, by the Interposition of the *Moon*,

And if you go on further, until you be 90 Degrees distant from the *Sun*, you will then have him in the Horizon, before he is got clear of the Eclipse; so that it is impossible for the *Sun*'s lower Limb to be touched by the *Moon*'s upper, any way in this Eclipse.

For the Velocity of the *Shadow* in this Eclipse.

OPERATION.

True hourly Motion ☽ à ☉ 27′ 21″ Decimally	27′.35
Miles in one Degree on the Earths surface	69.5
	13675
	24615
	16410
Moons Shad. travels in an Hour *English* Miles	1900.825

Which divided by 60′, gives 31.68 Miles in a Minute; a Motion, indeed, that would require *Pegasus* or *Perseus*'s Horse to keep pace with it.

When you have finished your Eclipse, it will be best to construct it for those Latitudes (according to Precept 18. Page 419. of my *System*) where you find by Calculation the *Sun* and *Moons* upper and lower Limbs just touch in the Meridian, and that 'twill strengthen your Judgment, and confirm your Work.

CHAP.

CHAP. XVI.

The Calculation of the principal Appearances of the Sun's Eclipſe, April 11, 1735.

Eq. Time tr. ♂.	Longit. ☉.				Anom ☉.			
	'	°	'	''	S.	°	'	''
Anno 1735	9	20	29	42	6	12	9	27
April 11	3	9	33	1	3	9	32	44
Hours 11			27	6			27	6
8' 56''			2	18			2	18
Mean Motion	1	0	32	6	9	22	11	35
Equation add		1	46	51				
Sun's tru. Place	1	2	18	57				

Eq. Time tr. ♂	Longit. ☽.				Anom ☽.				Node ☽.			
Anno 1735	4	19	48	37	7	8	0	34	6	29	47	30
April 11	8	10	48	57	7	29	33	50		5	20	54
Hours 11		6	2	21		5	59	17			1	27
Minutes 56			30	45			30	29				7
Seconds 8				4				4		5	22	28
Mean Motion	1	7	10	44	3	14	4	14	6	24	25	2
Equat. ſub.		4	51	47								
☽ in her Orb	1	2	18	57								
Node ſub.	6	24	25	2								
Arg. Lat.	6	7	53	55								
True Lat. *S. A.*			41	11								
Reduct. ſub.			1	47								
Eclipt. Place	1	2	17	10								

		'	''
Hourly Mot. of	☉	2	26
	☽	34	31
Hourly Mo. ☽ ☊	☉	32	5

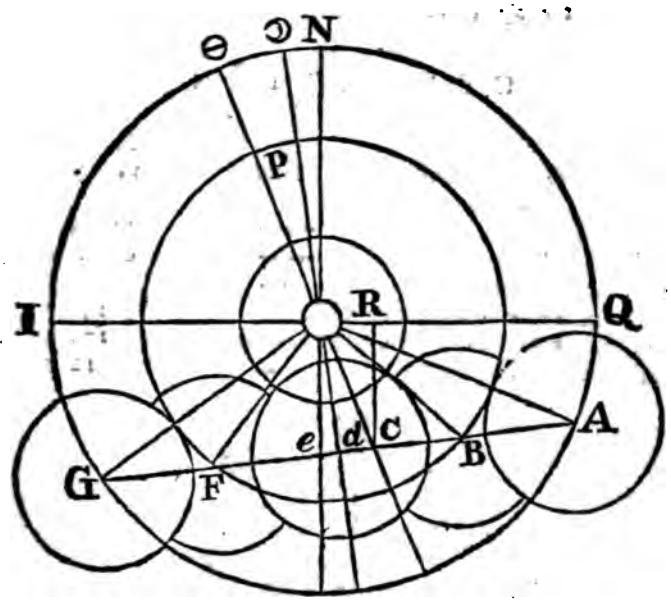
Equal

	d.	h.	′	″
Equal Time, true ☌ at *London* 1735, *April*	11	11	56	8
Equation of Time add			1	40
Apparent Time	11	11	57	48
Time of Reduction subtract and add			3	20
Apparent Time of the { Middle	11	11	54	28
Ecliptic Conjunction	11	12	1	8
Diff. Hor. Parall. ☉ and ☽ = Semid. *Earths* Disk			58	18
Sem. diameter of { *Sun*			15	58
Moon			15	54
Sum, = Semidiameter of the Penumbra			31	52
Sum *Earths* Disk and Penumbra			90	10
Difference *Earths* Disk and Penumbra			26	26
True Latitude of the Moon *S. A.*			41	11
True Hourly Motion of ☽ à ☉			32	5
Angle of the Moons Way = *e* ☉ *d*		5°	38	0
Angle of the two *Axes* = *e* ☉ *c*		20	10	0
Angle of Direction = *d* ☉ C		14	32	0
Suns Declination North		12	18	0
First Angle of Incidence = *d* ☉ A		62	49	0
Motion of half duration = A *d* 4812″ =		1	20	12
Time of half duration subtract and add		2	30	38
Second Angle of Incidence = *d* ☉ B		45	4	0
Motion of half duration Centr. B *d* = 2476″		0	41	16
Time of half duration Central sub. and add		1	17	7
Dist. Moon in *Earths* Axis = ☉ C 2552″			42	32
Motion from C to *d* = 640.6″			10	40
The same in Time sub.			19	58
Dist. Moon in Axis Ecliptic = ☉ *e*	2483″ =		41	23
Moons Latitude at C = *C* R	2396 =		39	56

By the above *Calculation*, I have found, when

	d.	h.	′	″
The Eclipse first begins at Sun-rising A *April*	11	9	23	50
Centrally eclipsed at Sun rising B		10	37	21
Meridional Sun *Centrally Eclipsed* C		11	34	30
Middle at *d* — —		11	54	28
Nonagesimal Sun *Centrally Eclipsed* *e*		12	1	8
Central Eclipse ends at Sun-setting F		13	11	35
The *Eclipse* ends at Sun-setting G		14	25	6
After the Penumbra has spent in passing over ⊖		5	1	16

1. To



1. To find the Place on the Globe where the *Eclipſe* begins at Sun-riſing; the *Center* of the Penumbra is then at A.

1. By the *Keplerian* Method.

OPERA-

1. By the *Keplerian* Method

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1735, *April*	11	9	23	50
Equation of Time ſub.			1	40
Equal Time	11	9	22	10
Sun's true Place	♉	2	12	43
Sun's Right Aſcenſion		30	1	0
Apparent Time from Noon add		140	57	30
Sum, Right Aſcenſion *M. Cæli* at *London*		170	58	30
Sun's Declination North		12	16	0

For the Angle Orient.

	°	′
Firſt Angle of Incidence = *d* ⊙ A	62	49
Angle of the Moon's Way = *c* ⊙ *d* add	5	38
Angle Orient = *e* ⊖ A	68	27

Now,

Now, for the Latitude of that Place.

	°	′	
As C.t. Angle ♈ ♉ R Orient	68	27	9.596508
To Radius	90	00	10.000000
So C.S. ♈ ♉	32	13	9.927396
To C.t. ♉ ♈ R	25	1	10.330888
Add ☌ ♈ ♉	23	29	
Z = ∠ ☌ ♈ R	48	30	

As S. ♉ ♈ R	25	1	Co Ar. 0.373781
To S. ☌ ♈ R	48	30	9.874456
So C.S. ☌ ♉ ♈	68	27	9.565036
To S. Latitude South	40	35	9.813273

For the Longitude.

	°	′	
As Radius — —	90	00	10.000000
To t. Latitude S.	40	35	9.932778
So t. ☉ Declination North	12	16	9.337311
To S. Aſc. Difference	10	44	9.270089
Sun's Right Aſcenſion Add	30	1	
Obl. Aſc. Aſcendant	40	45	+360
Sub.	90	0	
R. *A. M. Cæli*	310	45	0′′
R. *A. M. Cæli* at *London*	170	58	30
Longitude Eaſt	139	46	30

This Place falls on the Globe in the unknown Ocean South of *Hollandia Nova.*

2. By the *Flamſteedian* Method.

OPERATION.

	°	′
Firſt Angle of Incidence = *d* ☉ *A*	62	49
Angle of Direction = *d* ☉ *C*	14	32
Amplitude of the Path C ☉ *A*	48	17

	° ′	
As Radius — —	90 00	10.000000
To C. S. Amplitude of the Path	48 17	9.823114
So C. S. Sun's Declination	12 16	9.989970
To S. Latitude South	40 34	9.813084

For the Longitude of that Place.

	° ′ ″	
Aſcen. Difference in Time is	0 42 56	
Add	6 0 0	
Time of Sun-riſing there	6 42 56	+ 12 Hours.
Time at *London* ſub.	9 23 50	
Longitude Eaſt	9 19 6	= 139° 46′ 30″

---

2. To find the Place B on the Globe, where the Center of the Pedumbra is, when the Sun riſes Centrally Eclipſed.

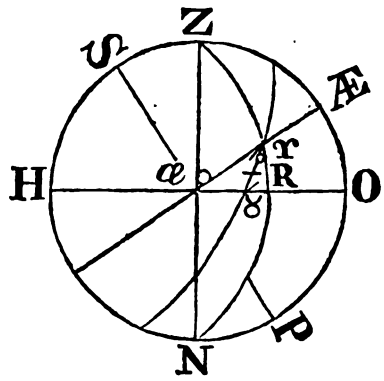
1. By the *Keplerian* Method.

	d. h.	′	″
Apparent Time at *London*, 1735, *April*	11 10	37	21
Equation of Time ſubtract		1	40
Equal Time — —	11 10	35	41
Sun's true Place ——	♉ 2	15	41
Sun's Right Aſcenſion —	30	4	0
Apparent Time from Noon add	159	20	15
Sum, is R. A. *M. Cæli* at *London*	189	24	15
Sun's Declination North —	12	17	0

For the Angle Orient.

	° ′ ″
Second Angle of Incidence = *d* ☉ B ♈	45 4 0
Angle of the Moon's Way = *e* ☉ *d* add	5 38 0
Angle Orient = *e* ☉ *b*	50 42 0

For



For the Latitude of the Place.

	°	′	
As C t. ♈ ♉ R ∠ Orient	50	42	9.913014
To Radius	90	00	10.000000
So C.S. ♈ ♉ Longitude	32	16	9 927151
To C.t. ♉ ♈ R	44	4	10.014137
Add ∠ ☌ ♈ ♉	23	29	
Z = ☌ ♈ R.	67	33	
As S. ♉ ♈ R	44	4	Co Ar. 0.157706
To S. ☌ ♈ R	67	33	9.965772
So C.S. ♈ ♉ R	50	42	9.801665
To S. Latitude South	57	19	9.925143

For the Longitude of that Place.

	°	′		
As Radius —	90	00		10.000000
To *t.* Lat. South	57	19		10.192751
So *t.* ☉ Declin. North	12	17		9·334871
To S. Aſcen. Difference	19	42		9.527622
R. Aſcen. Sum add	30	4		
Obl. Aſc. Aſcen.	49	46		
Sub.	90	0		
R. A. M. *Cæli*	319	46	0″	
R. A. M. *Cæli* at *London*	189	24	15	
Longitude East	130	21	45	

This Place falls on the Globe in the unknown *Southern Ocean.*

2. By the *Flamſteedian* Method.

OPERATION.

		° ′	
Second ∠ of Incidence *d* ⊙ B		45 4	
Angle of Direction *d* ⊙ C ſub.		14 32	
Amplitude of the Path ⇒*c* ⊙ B		30 32	
AsRadius		90 00	10.000000
To *C.S.* Amplitude Path		30 32	9.935171
So *C.S.* ⊙ Declination		12 17	9.989912
To S. Latitude South		57 19	9.925083

For the Longitude of that Place.

Aſcenſional Difference in Time	1	18	48	
Add	6	0	0	
Time of Sun-riſing there	7	18	48	+ 12 Hours.
Time at *London* ſub.	10	37	21	
Longitude Eaſt	8	41	27	= 130° 21′ 45′

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3. To find the Place C on the Globe, where the Center of the Penumbra is when the Sun is Centrally Eclipſed in the Meridian.

1. By the *Keplerian* Method.

OPERATION.

		☽ h.	′	″
Apparent Time at *London* 1735, *April*		11 11	34	30
Equation of Time ſub.	—		1	40
Equal Time	—	11 11	32	50
Sun's true Place	—	♉ 2	18	0
Sun's Right Aſcenſion	—	30	6	0
Apparent Time from Noon add		173	37	30
Right Aſcenſion M. Cœli at *London*		203	43	30
Sun's *Declination* North		12	18	0

For

For the Altitude of the Nonageſime Degree.

As Semidiameter of ☉'s Disk	3498″	3.543820
To Radius — —	90 00	10.000000
So Moon's Latitude at C	2396	3.379405
To *C.S.* Alt. Nonag. Degree	46 47	9.835585

For the *Meridian Angle* ſay,

	°	′	
As Radius ----	90	00	10.000000
To S. Obliquity Ecliptic	23	29	9.600409
So *C.S.* R.A. *M.C.* = ☉ R. A	30	6	9.937092
To *C.S.* Meridian Angle	69	50	9.537501

For the Diſt. *M. Cæli* from Nonageſime Degree.

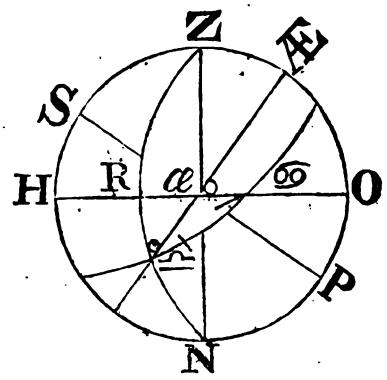
	°	′	
As Radius —	90	00	10.000000
To *C.s.* Alt. Nonageſime	46	47	9.972948
So *C.s.* Meridian Angle	69	50	9.564983
To S. Diſt. *M.C.* a Nonag.	20	11	9.537931

Now read Page 196.

		°	′	″
Sun's true Place	♉	2	18	0
Diſt. ſubtract		20	11	0
Nonageſime Degree		0	12	7	0
Add always		3	0	0	0
Cuſp of the Aſcendant		3	12	7	0

For the Latitude of the Place.

	°	′	
As *C.s.* ♌ ♋ ∠ Orient.	46	47	9.972948
To Radius —	90	00	10.000000
So *C.S.* ♋ ♎ Longitude	77	53	9.322019
To *C.s.* R. ♎ ♋	77	25	9.349071
Sub. ♌ ♎ ♋	23	29	
Rem. R. ♎ ♌	53	56	



	o	′	
As *S.* R ♎ ♋	77	25	Co Ar. 0.010559
To *S.* R. ♎ ♈	53	56	9.907590
So C.S. ♈ ♋ ♎	46	47	9.835538
To S. Lat. S.	34	33	9.753687

For the Longitude of that Place.

R.A. ☉ is now *R. A. M. Cæli*	30°	6′	+360°
R.A. M. Cæli at *London* ſub.	203	43	30″
Longitude to the Eaſt	186	22	30

This Place falls on the Globe in the unknown Southern Ocean.

2. By the *Flamſteedian* Method.

OPERATION.

	o	′	
As Semidiameter ☉'s Diſk	3498″		3.543820
To Radius —	90	00	10.000000
So Diſt. ☽ in *Earth*'s Axis	2552		3.406881
To S. Diſt. ☉ from Vertex	46	51	9.863061
Sun's Declin. North ſub.	12	18	
Latitude South	34	33	

For the Longitude of that Place.

	h.	′	″	
Time is there Noon =	24	0	0	
Time at *London* ſub.	11	34	30	
Diff. of Meridians Eaſt	12	25	30	=186° 22′ 30″

4. To find the Place *e* on the Globe, where the Sun is Centrally Eclipſed in the Nonageſime Degree.

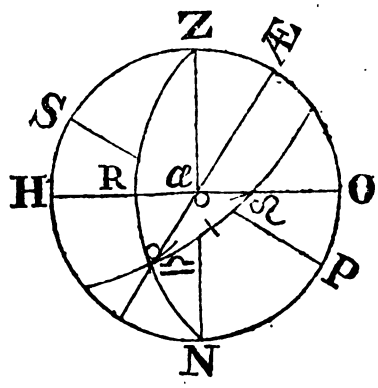
1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1735, *April*	11	12	1	8
Equation of Time ſub.			1	40
Equal Time	11	11	59	28
Sun's true Place		♉ 2	19	4
Sun's Right Aſcenſion		30	7	0
Apparent Time from Noon add		180	17	0
Sum, R. Aſcenſion *M. Cæli* at *London*		210	24	0
Suns Declination North		12	18	0

For the Altitude of the Nonageſime Degree.

	°	′		
As Semidiameter of the *Earths* Diſk	3498″			3 543820
To Radius —	90	00		10.000000
So Diſt. ☽ in Axis Ecliptic	2483			3 394977
To C.S. Altitude Nonageſime	44	48		9.851157
Suns Place = to Nonageſ. Degree	1	2	19′	
Add	3	0	0	
Sum, = to Cuſp Aſcendant	4	2	19	



For the Latitude of that Place.

	° ′	
As C.t. ♌ ♎ Orient	44 48	10.003032
To Radius —	90 00	10.000000
So C.S. ♌ ♎ Longitude	57 41	9.728027
To C.t. R ♎ ♌	62 2	9.724995
Sub. ∠ ♌ ♎ ♌	23 29	
Rem. R. ♎ ♌	38 33	
As S. R. ♎ ♌	62 2	Co Ar. 0.053931
To S. R. ♎ ♌	38 33	9.794626
So C.S. R ♌ ♎	44 48	9.850996
To S. Latitude South	30 3	9.699553

1. For the Declination of the Aſcendant ♌ 2° 19′.

	° ′	
As Radius —	90 00	10.000000
To S. Longitude ♌ ♎	57 41	9.926911
So S. Obliquity	23 29	9.600409
To S. Declination North	19 41	9.527320

2. F

2. For the Right Aſcenſion Aſcendant ♌ 2° 19'.

	o ′	
As Radius	90 00	10.000000
To *C.S.* Obliquity	23 29	9.962453
So *t.* Longitude	57 41	10.198884
To *t.* from *Libra* ſub.	55 23	10.161337
From	180 0	
Right Aſcenſion	124 37	

3. For the Aſcenſional Difference of the *Aſcendant* ♌ 2° 19'

	o ′	
As Radius —	90 00	10.000000
To *t.* Latitude South	30 3	9.762314
So *t.* Declination North	19 41	9.553548
To S. Aſc. Difference add	11 57	9.315862
R. *A. Aſcendant* add	124 37	
Obl. *Aſc. Aſcendant*	136 34	
Sub.	90 0	
R.A. *M.Cœli*	46 34 +360°	
R. A. *M. Cœli* at *London* ſub.	210 24	
Longitude Eaſt	196 10	

This Place falls on the Globe in the unknown Southern Ocean.

2. By the *Flamſteedian* Method.

OPERATION.

As Semidiameter of the Sun's Diſk	3498″	3.543820
To Radius —	90 00	10.000000
So Diſt. ☽ in Axis Ecliptic	2483	3.394977
To S.Azim.between ☉ and Vertex	45 13	9.851157

Now ſay,

		o	′	
As Radius	—	90	00	10.000000
To *C. S* Inclination of the Axis		20	10	9.972524
So *t.* Sun's Diſtance from Vertex		45	13	10.003032
To *t.* of the Fourth Arch		43	23	9.975556

Now read Page 204.

	o	′
Sun's Diſtance from the South Pole	102	18
Fourth Arch ſubtract	43	23
Remains the Fifth Arch	58	55

Now ſay,

	o	′		
As *CS.* of the Fourth Arch	43	33	Co Ar.	0.138601
To *C. S.* of the Fifth Arch	58	55		9.712889
So *C. S.* ⊙'s Diſt. from Vertex	45	13		9.847836
To S. Latitude South	30	2		9.699326

For the Longitude of that Place.

	o	′		
As S. of the Fifth Arch	58	55	Co Ar.	0.067315
To S. of the Fourth	43	23		9.836878
So *t.* Inclination of the *Axis*	20	10		9.564583
To *t.* Hour from Noon in *Nonag.*	16	24		9.468776

Now read Page 205.

	h.	′	″		
From	24	0	0		
Sub. Time at *London*	12	1	8		
Complement	11	58	52	= 179°	43′
Add the Hour from Noon				16	24
Sum, is the Longitude Eaſt from *London*				196	7
Weſt				163	53

5, To

5. To find the Place F on the Globe, where the Sun is ſeen to ſet Centrally Eclipſed.

2. By the *Keplerian* Method.

OPERATION.

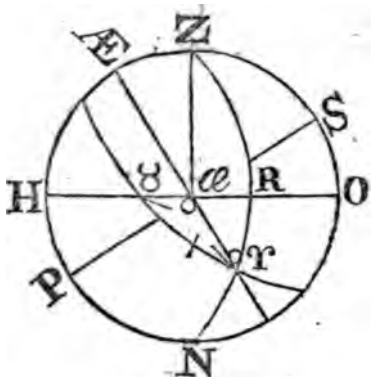
	d.	h.	′	″
Apparent Time at *London* 1735, *April*	11	13	11	35
Equation of Time ſub.			1	40
Equal Time at *London* ——	11	13	9	55
Sun's true Place ——	♉	2	21	56
Sun's Right Aſcenſion —		30	10	0
Apparent Time from Noon add		197	53	45
Sum, Right Aſcenſion M. *Cæli* at *London*		228	3	45
Sun's Declination North —		12	19	♑

For the Angle Orient.

	′	″	
Second Angle of Incidence = *d* ⊙ F	45	4	
Angle of the Moon's Way = *e* ⊙ *d*	5	38	ſub.
Angle Orient = F ⊙ *e*	39	26	

For

For the Latitude of the Place.



	° ′	
As C. t. ♈ ♉ R Orient	39 26	10.084926
To Radius —	90 00	10.000000
So C.S. ♉ ♈ Longitude	32 22	9.926671
To C.t. ♉ ♈ R	55 13	9.841745
Sub. ♉ ♈ ☌	23 29	
Rem. ☌ ♈ R	31 44	
As S. ♉ ♈ R	55 13 Co Ar.	0.085489
To S. ☌ ♈ R	31 44	9.720958
So C. S. ♈ ♉ R	39 26	9.887822
To S. Latitude South	29 39	9.694269

For the Longitude of that Place.

	° ′	
As Radius — —	90 00	10.000000
To *t.* Latitude South	29 39	9.755291
So *t.* ☉'s Declination North	22 19	9.339133
To S. Aſcenſional Diff. ſub.	7 8	9.094424
Sun's Right Aſcenſion	30 10 from	
Oblique Deſc. Deſcendant	23 2	

Add

	°	′	″
Add —	90	00	00
Sum. R. A. *M. Cæli*	113	2	00
R. A. *M. Cæli* at *London* ſub.	228	3	45
Rem. Longitude Eaſt	244	58	15

This Place falls on the Globe in the Pacifick Ocean.

2. By the *Flamſteedian* Method.

OPERATION.

	°	′
Second Angle of Incidence = F ☉ *d*	45	4
Angle of Direction *d* ☉ C add	14	32
Sum, Amplit. of the Path = F ☉ C	59	36

	°	′	
As Radius —	90	00	10.000000
To *C. S.* Amplitude	59	36	9.704179
So *C.S.* ☉ Declination	12	19	9.989887
To ♑ Latitude South	29	38	9.694066

For the Longitude.

	h.	′	″	
Aſcen. Diff. in Time is	0	28	32	ſub.
From	6	0	0	
Time Sun-ſetting there	5	31	28	+ 24 Hours.
Time at *London* ſub.	13	11	35	
Longitude Eaſt	16	19	53	= 244° 58′ 15″

6. To

6. To find the Place G on the Globe, where the Center of the Penumbra is, when the Sun is ſeen to ſet as the Eclipſe ends.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, 1735, *April*	11	14	25	6
Equation of Time ſub. —			1	40
Equal Time —	11	14	23	26
Sun's Place then —	♉	2	24	55
Sun's Right Aſcenſion		30	13	0
Apparent time from Noon add		216	16	30
Sum, is the R. A. *M. Cæli* at *London*		246	29	30
Sun's Declination North		12	20	0

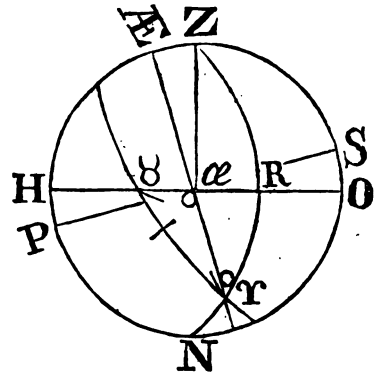
For the Angle Orient.

	°	′
Firſt Angle of Incidence = G ⊙ *d*	62	49
Angle of the Moon's Way = *e* ⊙ *d*	5	38
Angle Orient = G ⊙ *f*	57	11

Now, for the Latitude of that Place.

	°	′	
As *C.t.* ♈ ♉ R. Orient	57	11	9.809471
To Radius	90	00	10.000000
So *C.S.* ♉ ♈ Longit.	32	25	9.926431
To *Ct.* ♉ ♈ R	37	23	10.116960
Sub. ♉ ♈ ☌	23	29	
Rem. ☌ ♈ R	13	54	

As



	°	′	
As S. ♉ ♈ R	37	23 Co Ar.	0.216708
To S. ♌ ♈ R	13	54	9.380624
So C.S. ♈ ♉ R	57	11	9.733961
To S. Lat. South	12	23	9.331293

For the Longitude of that Place.

	°	′	
As Radius —	90	00	10.000000
To *t.* Latitude South	12	23	9.341552
So *t.* ☉ Declinat. North	12	20	9.339739
To S. Aſc. Difference ſub.	2	46	8.681291
Sun's Right Aſcenſion	30	13 from	
Obl. Aſc. Deſcendant	27	27	
Add	90	00	
R. A. M. Cæli	117	27 +360°	
R. A. M. Cæli at *London* ſub.	246	29 30″	
Longitude Eaſt	230	57 30	

This Place falls on the Globe, in the *Mare del Zur.*

The Central Shade of the Moon in this Eclipſe firſt toucheth the Globe in the unknown South Ocean Lat. 57° 19′ S. and Long. 130° 21′ 45′, Eaſt; and bends its Courſe North-Eaſterly, where in the ſame Ocean it gives the laſt ſtroke, and goes down Centrally Eclipſed; but will ſcarce be ſeen by any, by reaſon of its Remoteneſs from the *European* Traders. The *Shadow* paſſes over the Globe with a Velocity of 37 Miles in a Minute of Time.

In any *Solar Eclipſe*, when there are three Angles of Incidence (which I have explained in Page 181.) that Place on the Globe, where the *Sun* riſes as the Eclipſe ends, is the moſt remote Place to the Weſt of *London* that ſees any thing of the Eclipſe; and where the Eclipſe begins at *Sun ſetting*, the moſt remote Place Eaſt of *London* that ſees any thing of it.

But if there are only two Angles of Incidence, that Place where the *Sun* riſes Centrally Eclipſed, is the remoteſt place Weſtward from *London*; and that place where he ſets Centrally Eclipſed, is the remoteſt place Eaſt, that ſees any thing of that Eclipſe.

Theſe things being rightly underſtood, when you have finiſhed the Work of any Eclipſe, according to the above Directions, have recourſe to a Terreſtrial Globe, and lay a Thread from the Place where the *Sun* riſes as the Eclipſe ends, in the firſt Caſe, to the place where the Eclipſe begins at *Sun-ſetting*; or, from the place, on the Globe, where the *Sun*, in the ſecond Caſe, riſes Centrally Eclipſed, to the place where he ſets Centrally Eclipſed; and that Thread, or a Chalk ſo drawn, ſhall repreſent the Paſſage of the Center of the Moon's ſhadow over that part of the Globe during the time of the Eclipſe.

CHAP.

8. To find the Place on the Globe, where the Sun's upper Limb is touched by the Moon's lower Limb in the Meridian.

OPERATION.

	°	′
Semidiameter of the Penumbra	31	52
Dift. Moon in Earths *Axis* South	42	32
Difference ——	10	40

Now ſay,

	° ′	
As *Semidiameter* Earth's Disk	3498″	3.543820
To Radius ——	90 00	10.000000
So Difference in *Seconds*	640	2.806180
To S. Arch Merid. ⊙ & *Vertex*	10 33	9.262360
Sun's Declination North	12 18	
Rem. Latitude North	1 45	

This Place falls on the Globe, in the unknown Ocean, North of *Mare del Zur*.

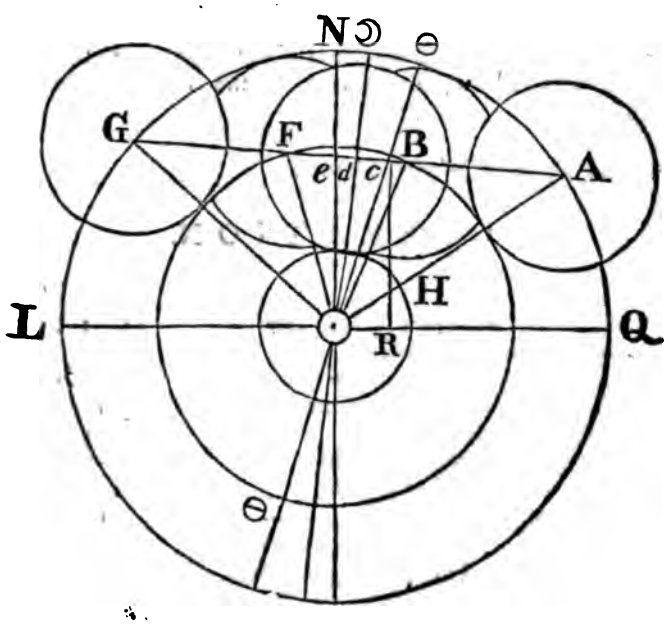
The

	d.	h.	′	″
Equal Time, true ☌ at *London* 1739, *July*	24	3	49	4
Equation of Time ſub.			5	3
Apparent Time	24	3	44	1
Time of Reduction ſubtract and add			4	5
Apparent Time of the { Middle 1739, *July*	24	3	39	1
{ Ecliptic Conjunction	24	3	49	
Diff. Hor. Parall. ☉ and ☽ = Semid. *Earths* Disk			55	
Semidiameter of { *Sun*			15	5
{ *Moon*			15	1
Sum, = Semidiameter of the Penumbra			31	
Sum, *Earths* Disk and Penumbra = ☉ A			86	1
Difference *Earths* Disk and Penumbra = ☉ H			22	59
True Latitude of the Moon *N. A.* = ☉ *d*			52	35
True Hourly Motion of ☽ à ☉			27	31
Angle of the Moons Way = *e* ☉ *d*		5°	41	0
Angle of the two *Axes* = *e* ☉ *c*		16	7	0
Angle of Direction = *d* ☉ C		10	26	0
Suns Declination North		17	19	0
Firſt Angle of Incidence = *d* ☉ A		52	24	0
Motion of half duration = *d* ☉ *c* 4097″			1 8	17
Time of half duration ſubtract and add			2 28	44
Second Angle of Incidence = *d* ☉ B		17	20	0
Motion of half duration Centr. = *d* B 984.6″ =			16	24.6
Time of half duration ſub. and add			35	47
Diſt. Moon in *Earths* Axis = ☉ C 3208″			53	28
Motion from C to *d* = 581″			9	41
The ſame in Time ſub.			21	7
Diſt. Moon in Axis Ecliptic = ☉ *e* 3171″			52	51
Moons Latitude at C = *C* R = 3082″			51	22

Now, according to Precept 17, of my *Syſtem*, I have by the above *Calculation*, found the times when

	d.	h.	′	″
The Eclipſe begins at Sun-riſing A 1739, *July*	24	1	10	33
Centrally Eclipſed at Sun-riſing B		3	3	30
Meridional Sun *Centrally Eclipſed C*		3	18	10
Middle at *d* — —		3	39	17
Nonageſimal Sun *Centrally Eclipſed e*		3	49	5
Central Eclipſe ends at Sun-ſetting F		4	15	4
The *Eclipſe* ends at Sun-ſetting G		6	8	1
Total Duration is		4	57	28

You



You are always to obſerve, that that Pole which is of the ſame Name with the Sun's Declination, is always illuminated; which in this Scheme falls in the Earth's *Axis* near C; which Pole is purpoſely omitted, to prevent crowding the Figure too much.

To find the Pole in the enlightned Disk in any Projection (of this nature) make the Semidiameter of the Earth's Disk the Radius of a Line of *Sines* on the *Sector*; and from thence take the *Sine* of the ⊙'s Diſtance from the neareſt Pole, and ſet it in the Projection from ⊙ to *P* in the Earth's *Axis*, and that gives the place of the enlighten'd *Pole* in the Earth's Disk; and it is the North Pole, if the Sun hath North Declination; but the South, if he hath South Declination.

1. To find the Place on the Globe, where the Eclipſe begins at Sun-riſing; the Center of the *Penumbra* is then at A.

1. By the *Keplerian* Method.

OPERATION.

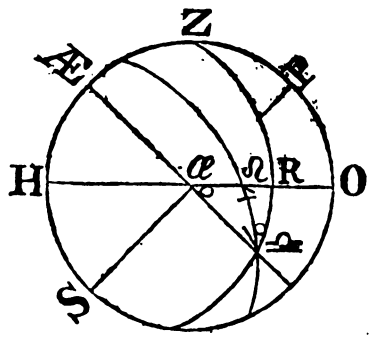
	d.	h.	′	″
Apparent Time at *London*, 1735, *July*	24	1	10	33
Equation of Time ſubtract			5	36
Equal Time — —	24	1	16	9
Sun's Place then in the Aſcendant	♌	11	33	47
Sun's Right Aſcenſion —		134	2	0
Apparent Time from Noon add		17	38	15
Sum, is R. A. *M. Cœli* at *London*		151	40	15
Sun's Declination North —		17	21	0

For the *Angle* Orient.

	°	′
Firſt Angle of Incidence *d* ⊙ A	52	24
Angle of the Moon's Way = *e* ⊙ *d* add	5	41
Angle Orient = *e* ⊙ A in Scheme above	58	05

For the Latitude of the Place in the following Scheme

As



		° ′	
As *Ct.* ♎ ☊ R ∠ Orient		58 5	9.794383
To Radius	—	90 00	10.000000
So *C.S.* ☊ ♎ Longitude		48 26	9.821839
To *Ct.* ☊ ♈ R		43 11	10.027452
Add ☌ ♎ ☊		23 29	
Z ∠ ☌ ♎ R		66 40	
As *S.* ☊ ♎ R		43 11	Co Ar. 0.164731
To *S.* ☌ ♎ R		66 40	9.962945
So *C.S.* ♎ ☊ R		58 5	9.723197
To S. Latitude North		45 11	9.850873

For the Longitude of this *Place*.

		° ′	
As Radius	—	90 00	10.000000
To *s.* Latitude North		45 11	10.002779
So *s.* ☉'s Declination North		17 21	9.494743
To S. Aſcenſional Difference ſub.		18 20	9.497522
Sun's Right Aſcenſion from		134 2	
Rem. Oblique Aſcenſion		115 42	
Sub.		90 00	
R. A. M. Cœli		25 42	0′ + 360°
R. A. M. Cœli at *London*		151 40	15
Longitude Eaſt		234 1 45	W. 125° 58′ 15″

This *Place* falls on the Globe, in the unknown Ocean, between *China* and *America*.

2. By the *Flamſteedian* Method.

	°	′
Firſt Angle of Incidence *d* ⊙ A	52	24
Angle of Direction *d* ⊙ C ſub.	10	26
Amplit. of the Path = C ⊙ *A*	41	58

in the Univerſal Diagram.

	°	′	
As Radius —	90	00	10.000000
To C.S. Amplit. of the Path	41	58	9.871301
So C.S. ☉ Declination	17	21	9.979776
To S. Latit. of the Place North	45	12	9.851077

For the Difference of Meridians.

	h.	′	″	
The Aſcen. Diff. in time is	1	13	20	
From	6	0	0	
Time of Sun-riſing	4	46	40	+ 24 Hours.
Time at *London* ſub.	1	10	33	
Diff. Meridians to the Eaſt	15	36	7	= 134° 1′ 45″ (as before.

2. To find the Place B on the Globe, where the Center of the *Penumbra* is when the Sun is ſeen to riſe Centrally Eclipſed.

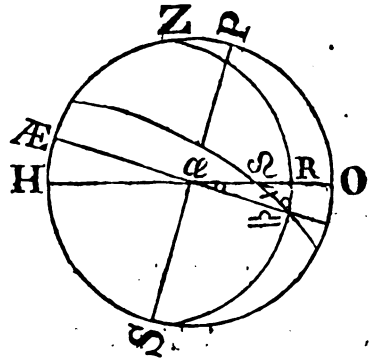
1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London*, 1739, *July*	24	3	3	30
Equation of Time add			5	36
Equal Time	24	3	9	6
Sun's true Place	☌	11	38	18
Sun's Right Aſcenſion		134	6	0
Apparent Time from Noon add			45	32 30
Sum R. A. *M. Cœli* at *London*		179	58	30
Sun's Declination North		17	20	9

For the Angle Orient.

	°	′
Second Angle of Incidence = *d* ☉ B	17	20
Angle of the Moon's Way = *e* ☉ *d* add	5	41
Angle Orient	23	1



For the Latitude of the Place.

	°	′	
As C.*t.* ♎ ☊ R	23	1	10.371797
To Radius	90	00	10.000000
So. C.S. ☊ ♎	48	22	9.822404
To C.*t.* ☊ ♎ R	74	14	9.450607
Add ☌ ♎ ☊	23	29	
Z = ☌ ♎ R	97	43	Compl. 82° 17′
As S. ☊ ♎ R	74	14	Co Ar. 0.016655
To S. ☌ ♎ R	82	17	9.996066
So C.S. ♎ ☊ R	23	1	9.963972
To S. Lat. North	71	23	9.956693

For the Longitude of this Place.

	° ′	
As Radius	90 00	10.000000
To t. Latitude North	71 23	10.472549
So t. ☉ Declin. North	17 20	9.494299
To S.A. Difference	67 54	9.966848
Sun's R. Aſcen.	134 6	
Obl. Aſc. Aſcendant	66 12 + 360°	
Sub.	90 0	
R. Aſcenſion *M. Cœli*	336 12 0″	
R. A. *M. Cœli* at *London*	179 58 30	
Longitude Eaſt	156 13 30	

This Place falls on the Globe, in the unknown Ocean, North-Weſt of *America.*

2. By the *Flamſteedian* Method.

OPERATION.

	° ′	
Second ∠ of Incidence *d* ☉ B	17 20	
Angle of Direction *d* ⊙ *C* ſub.	10 26	
Amplitude of the Path = *C* ⊙ B	6 54	
	° ′	
As Radius	90 00	10.000000
To *C.S.* Amplitude of the Path	6 54	9.078814
So *C. S.* Sun's Declination	17 20	9.979316
To S. Latitude North	71 22	9.976628

For the Difference of Meridians.

	d. h. ′ ″	
Aſc. Difference in time is	4 31 36	
From	6 0 0	
Time Sun-riſing	3 28 24	+ 12 Hours.
Time at *London* ſub.	3 3 30	
Diff. Meridians Eaſt	10 24 54	= 156° 13′ 30″.

3. To

3. To find the Place C on the Globe, where the Center of the *Penumbra* is, when the Sun is Centrally Eclipſed in the Meridian.

1. By the *Keplerian* Method.

OPERATION.

	d.	h.	′	″
Apparent Time at *London* 1739, *July*	24	3	18	10
Equation of Time add			5	36
Equal Time	24	3	23	46
Sun's true Place	☌	11	38	54
Sun's Right Aſcenſion		134	7	0
Apparent Time from Noon add		49	32	30
Sum, R. Aſcenſion *M. Cœli* at *London*		183	39	30
Suns Declination North		17	19	0

For the Altitude of the Nonageſime Degree.

	o	′	
As Semidiameter of the *Earths* Diſk	3305″		3.519171
To Radius —	90	00	10.000000
So ☽'s Latitude at C	3082		3.488833
To *C.S.* Altitude Nonageſime Degr.	21	10	9.969662

For the Meridian Angle.

	o	′	
As Radius —	90	00	10.000000
To S. Obliquity	23	29	9.600409
So C.S. R.A. *M.C.* = ☉ *R.A.*	45	53	9.842685
To C.S. Meridian Angle	73	54	9.443094

For

For Diſtance *M.C.* from Nonageſime Degree.

	S.	°	′	″	
As Radius —		90	00		10.000000
To *C.t.* Alt. Nonag. Degree		21	10		10.412059
So *C.t.* Meridian Angle		73	54		9.460349
To S. Diſt. *M.C.* à Nonag.		48	12		9.872408
Sun in the Meridian	♌	11	38	54″	
Rem. Nonag. Degree		2	23	26	54
Add		3	0	0	0
Cuſp Aſcendant		5	23	26	54
Complement = ♏ ♎		0	6	33	6

For the Latitude of this Place.

	°	′	
As C.t. ♎ ♏ R	21	10	10.412059
To Radius	90	00	10.000000 c
So C.S. ♏ ♎	6	33	9.997156
To C. t. ♏ ♎ R	68	58	9.585097
From ♏ ♎ œ	156	31	Comp. Æ ♎ ♏ 23° 29′
Rem. R ♎ œ	87	33	

	°	′		
As S. ♈ ☗ R	68	58	Co Ar.	0.029945
To S. R. ☗ ☌	87	33		9.999603
So C.S. ☗ ♈ R	21	10		9.969665
To S. Lat. North	86	33		9.993213

Beyond the North Pole.

For the Longitude of that Place.

	h.	′	″	
R. Aſcen. ☉ now is *R. A. M. Cœli*	134	7	0	+360°
R. A. M.C. at *London* ſub.	183	39	30	
Longitude Eaſt from *London*	310	27	30	
Longitude Weſt	49	32	30	

This Place falls on the Globe, in the North Frozen Sea, North-Eaſt of *Great Tartary*.

2. By the *Flamſteedian* Method.

OPERATION.

	°	′		
As Semidiameter ☉'s Diſk		3305″		3.519171
To Radius	90	00		10.000000
So Diſt. ☽ in Earth's Axis		3208		3.506234
To S. Diſt. ☉ from the Vertex	76	5		9 987063
Sun's Declination North add	17	19		
Sum	93	24	Sub. from 180°	
Latitude North	88	36	beyond the Pole.	

For the Longitude of that Place.

	h.	′	″	
Time is there Noon	24	0	0	
Time at *London* ſub.	3	18	10	
Rem. Longitude Eaſt	20	41	50	=310° 27′ 30″ *as above*

4. For

4. To find the Place *e* on the Globe, where the Sun is Centrally Eclipſed in the Nonageſime Degree.

1. By the *Keplerian* Method.

OPERATION.

		d.	h.	′	″
Apparent Time at *London*, 1739, *July*		24	3	49	5
Equation of Time ſub.	—			5	36
Equal Time	—	24	3	54	41
Sun's Place then	—	*Leo*	11	40	8
Sun's Right Aſcenſion			134	8	0
Apparent time from Noon add			57	16	15
Sum, is the R. A. *M. Cæli* at *London*			191	24	15
Sun's Declination North			17	19	0

For the Altitude Nonageſime Degree.

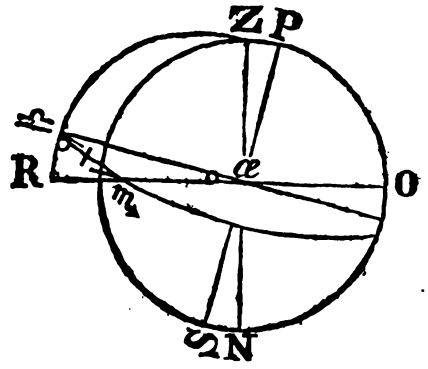
		′		
As Semidiameter Earth's Diſk	3305″			3.519171
To Radius	90	00		10,000000
So Diſt. ☽'s Axis Ecliptic	3171			3.501196
To C.S. Altitude Nonageſime	16	22		9.982025

The Complement of this is 73° 38′, ☉'s Diſtance from the Vertex; the ſame with the firſt Operation in the *Flamſteedian* Method.

		°		″
Sun's Place is = Nonag. Deg.	4ſ.	11	40	8
Add	3	00	00	0
Sum is the Cuſp Aſcend.	7	11	40	8

As

	°	′	
As C.s. R ♏ ♎ Orient	16	22	10.532120
To Radius	90	00	10.000000
So C.S. ♎ ♏ Longitude	48	20	9.873335
To C.s. R ♎ ♏	77	38	9.541215
Add ∠ ♏ ♎ ♋	23	29	
Z ∠ R ♎ ♋	101	7	
From	180	0	
Remains	78	53	



	°	′		
As S. R ♎ ♏	77	38	Co Ar.	0 010198
To S.R ♎ ♋	78	53		9.991774
So C.S. R ♏ ♎	16	22		9.982035
To S. Lat. North.	74	33		9.984008

For the Declination of the *Aſcendant* ♏ 11° 40′ 8″

	°	′	
As Radius —	90	00	10.000000
To S. Longitude —	41	40	9.822688
So S. Obliquity —	23	29	9.600409
To S. Declination South	15	39	9.423097

2. For

		o ′	
As Radius	—	90 00	10.000000
To C.S. Obliquity		23 29	9 962453
So *t.* Longitude		41 40	9 949353
To *t.* of		39 13	9.911806
Add		180 0	
R. A. Aſcendant		219 13	
R. A. M-Cœli		191 24	
		27 49	

3. For the Aſcenſional Difference of Aſcendant.

		o ′	
As Radius	—	90 00	10.000000
To t. Latitude North		74 33	10.558486
So t. Declination South		15 39	9.447384
To A. Difference		00 00	10 005870

This may ſerve for an Eſtimate.

Hence, becauſe the Declination of the *Aſcendant* ♏ 11° 40′ = 15° 39′ South, is more than the Co-Latitude 15° 27′, proves that that Point of the Ecliptic has no *Oblique Aſcenſion*; becauſe it never appears above that Horizon.

But, if you take for the Latitude of the Place 74° 21′, and work as in the laſt Work above, you will find the fourth proportional Sine to be equal to Radius 10.000000, or Sine of 90°.

So that when ever the like Caſe happens, you may ſave the trouble of working the two laſt Analogies.

To prove this, take a Globe, and elevate the Pole 74° 33′, and moving it round, you will find ♏ 11° 40′ will not aſcend the Horizon.

2. By

2. By the *Flamſteedian* Method.

OPERATION.

As Semidiameter Earth's Disk	33054		3.519171
To Radius —	90	00	10.000000
So Dift. ☽ in Axis Ecliptic	3171		3.501196
To S. *Azim.* between ☉ and *Vertex*	73	38	9.982025
As Radius —	90	00	10.000000
To *C. S* Inclination of the Axis	16	7	9.982587
So *t.* Sun's Diſtance from Vertex	73	38	10.532120
To *t.* of the Fourth Arch ſub.	73	00	10.514707
Sun's Diſtance from the North Pole	72	41 + 360°	
Remains the Fifth Arch	0	19 Complement	
As *CS.* of the Fourth Arch	73	0 Co Ar.	0.534065
To *C. S.* of the Fifth Arch	0	19	9.999993
So *C. S.* ☉'s Diſt. from Vertex	73	38	9.449915
To S. Latitude North	74	32	9.983973

For the Longitude of that Place.

As S. of the Fifth Arch	0	19 Co Ar.	2.257523
To S. of the Fourth Arch	73	0	9.980596
So *t.* Inclination *Axis*	16	7	9.460829
To *t.* Hour à Noon in *Nonag.*	88	51	11.698948

	h.	′	″	
From	24	0	0	
Time at *London*	3	49	5	
Complement	20	10	55	= 302°33′45″
Add Hour from Noon				88 51 0
Longitude Eaſt				31 24 45

5. To

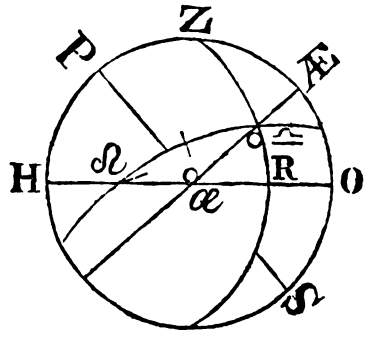
5. To find the Place F on the Globe, where the Sun is ſeen to ſet Centrally Eclipſed.

1. By the *Keplerian* Method.

	d.	h.	′	″
Apparent Time at *London* 1739, *July*	24	4	15	4
Equation of Time add			5	36
Equal Time at *London* ——	24	4	20	40
Sun's true Place ——	☌	11	41	9
Sun's Right Aſcenſion —		134	9	0
Apparent Time from Noon add		63	46	0
Sum, Right Aſcenſion *M. Cæli* at *London*		197	55	0
Sun's Declination North —		17	19	0

For the Angle Orient.

	′	″
Second Angle of Incidence = F ⊙ *d*	17	20
Angle of the Moon's Way = *e* ⊙ *d* ſub.	5	41
Angle Orient = F ⊙ *e*	11	39



For

	°	′	
As C. *s.* ♌ ♑	11	39	10.685753
To Radius	90	00	10.000000
So C.S. ♑ ♓	48	19	9.822830
To C. *s.* ♑ ♓ R	82	11	9.137077
Sub. ♑ ♓ ♌	23	29	
Angle ♌ ♓ R	58	42	

As S ♑ ♓ R	82	11	Co Ar. 0.004054
To S. ♌ ♓ R	58	42	9.931691
So C.S. ♌ ♑ ♓	11	39	9.990960
To S. Lat. North.	56	25	9.926705

For the Longitude of that Place.

	°	′	
As Radius ----	90	00	10.000000
To *s* Latitude North	56	25	10.177846
So *s.* ☉ Declin. North	17	19	9.493854
To S. Aſc. Difference	28	0	9.671709
Sun's R. Aſcen. add	134	9	
Obl. Deſc. Deſcend.	162	9	
Add	90	0	
R. A. M. Cæli	252	9	
R. A. M. Cæli at *London*	197	55	
Longitude East	54	14	

This Place falls on the Globe in the Eaſtern Parts of *Muſcovia.*

2. By the *Flamſteedian* Method.

OPERATION.

	°	′
Second ∠ of Incidence F ☉ *d*	17	20
Angle of Direction *d* ☉ C add	10	26
Amplitude of the Path = F ☉ *s*	27	46

As Radius	90 00	10.000000
To *C.S.* Amplitude Path	27 46	9.946871
So *C.S.* ⊙ Declination North	17 19	9.979855
To S. Latitude North	56 25	9.926726

For the Longitude of that Place.

	h.	′	″	
Aſc. Diff. in Time is	1	52	0	
Add	6	0	0	
Time of Sun-ſetting there	7	52	0	
Time at *London* ſub.	4	15	4	
Longitude East	3	56	4	= 54° 14′ as before.

---

6. To find the Place G on the Globe, where the Center of the Penumbra is when the Sun is ſeen to ſet as the Eclipſe ends.

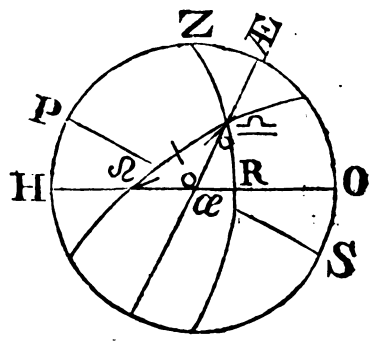
1. By the *Keplerian* Method.

		D.	h.	′	″
Apparent Time at *London* 1739, *July*		24	6	8	1
Equation of Time ſub.	—			5	36
Equal Time add	+	24	6	13	37
Sun's true Place	=	♌ 11	45	41	
Sun's Right Aſcenſion	—	134	14	0	
Apparent Time from Noon add		192	0	15	
Sum, *Right Aſcenſion M. Cœli* at *London*		226	14	15	
Sun's *Declination* North		17	17	0	

For the Angle Orient.

	°	′
Firſt Angle of Incidence G ⊙ *d*	52	24
Angle of the Moon's Way *e* ⊙ *d* ſub.	5	41
Rem. Angle Orient	46	43

For



For the Latitude of the Place.

	°	′	
C.s. ♌ ♎	46	43	9.973907
Radius	90	00	10.000000
C.S. ♎ ♌	48	14	9.823538
C.s. ♌ ♎ R	54	44	9.849631
tract ♌ ♎ ♒	23	29	
m. ♒ ♎ R	31	15	
S. ♌ ♎ R	54	44	Co Ar. 0.088058
S. ♒ ♎ R	31	15	9.714977
C.S. ♒ ♌ ♎	46	43	9.836075
S. Latitude North	25	48	9.639110

For the Longitude of that Place.

	° ′	
As Radius —	90 00	10.000000
To t. Latitude North	25 48	9.684324
So t. ☉'s Declin. North	17 17	9.492964
To S. Aſc. Difference	8 39	9.177288
Sun's R. Aſcenſion add	134 14	
Obl. Deſc. Deſcendant	142 53	
Add	90 0	
R. A. M. Cæli	232 53 0″	
R. A. M. Cæli at *London*	226 14 15	
Longitude East	6 38 45	

This Place falls on the Globe, near *Teebart* in *Barbary*, a Province of *Biledulgerid*, North-East from the *Lybian* Deſart.

2. By the *Flamſteedian* Method.

OPERATION.

	° ′
Firſt Angle of Incidence G ☉ *d*	52 14
Angle of Direction *d* ☉ C add	10 26
Amplitude of the Path G ☉ C	62 50

	° ″	
As Radius —	90 00	10.000000
To *C.S.* Ampl. of the Path	62 50	9.659517
So *C.S.* ☉ Declination	17 17	9.979951
To S. Latitude North	25 51	9.639468

For the Longitude.

	h. ′ ″	
Aſcen. Diff. in Time is	0 34 36	
Add	6 0 0	
Time Sun-ſetting there	6 34 36	
Time at *London* ſub.	6 8 1	
Longitude East	0 26 35 =	6° 38′ 45″

7. To

7. To find the Place on the Globe, where the Sun's upper Limb is juſt touched by the Moon's lower Limb in the Meridian.

OPERATION.

	°	′
Semidiameter of the Penumbra	31	6
Diſt. Moon in Earths *Axis*	53	28
Difference ——	22	12

Now ſay,

	° ′	
As *Semidiameter* Earth's Diſk	3305″	3.519178
To Radius ——	90 00	10.000000
So Difference	1342	3.127752
To ſ. Diſt. ☉ from *Vertex*	23 57	9.608581
Sun's Declination North add	17 17	
Sum Latitude North	41 14	

This Place falls on the Globe, in the North Weſt Parts of *Perſia*, near the *Caſpian* Sea.

8. To find the Place on the Globe, where the Sun's lower Limb is touch'd by the Moon's upper Limb in the Meridian.

OPERATION.

	°	′
Semidiameter of the Penumbra	31	6
Moon's Diſtance in Earth's Axis add	53	28
Sum	84	34

This being more than the Semidiameter of the Earth's Disk, proves, this Phænomenon is not any where conſpicuous.

The Central Shade firſt enters on the Globe, in the unknown Ocean North-Weſt of *America*, and bends its Courſe Eaſterly, tending towards the South, paſſing over the Northern Parts of *America*, croſſing the *Hyperborean* Sea, *Norway*, *Swedeland*, the Baltic, and the Gulph of *Finland*, where it enters *Moſcovia*, near *Petersburgh*, and leaves the Earth near the Eaſtern Parts of *Moſcovy*, where the Sun will ſet Centrally Eclipſed.

e *Moon's* Shadow paſſeth over the Earth with a Velocialmoſt 32 Miles in a Minute; which is but a ſlow n compariſon to what it goes when the *Moon* is in Pe- ; for then the Shadow travels with a Velocity of 41 , 2 Furlongs, 37 Poles in a Minute, if it happens about iddle of *June*; but at any other time of the Year its ity is ſomething leſs.

l if the Eclipſe happens at the *Moon's* Apogeon, the w moves only 31 275 Miles in a Minute, if this falls Middle of *December*; but at any other time ſomenore.

hat the two Extreams of the Motion of the Shadow of *on* over the Earth's Disk during the time of a Solar e, are 41 and 31 Miles in a Minute of time, omitting actional Parts of a Mile, .296 and .275.

ıd only goes 11 Miles in a Minute; but Light travels ıch a prodigious Velocity, that it almoſt ſurpaſſes our ſtanding: For when the Earth is in Perihelion, its n is no leſs than 15255859 Miles in a Minute of See my *Syſtem*, Vol. I. Page 442.

exerciſe the young Tyro in theſe matters, I ſhall here ı the Times of the Great Eclipſe of the Sun, that will ı in 1748, according to the Tables in my *Syſtem*, uſing v Equation in Page 111, of this Book.

	d.	h.	′	″
rime true ☌ 1748, *July*	13	23	28	25
ıd Moon in —	*Leo*	2	42	34
the Apparent time at *London* of the				
ing 1748. *July* —	13	21	4	55
Conjunction —		22	39	58
ſt Obſcuration		22	40	49
— —	14	0	19	1
Duration —		3	14	6
Eclipſed are on the upper ſide		10	26	13

The Times of the General Eclipſe fall thus, *viz.*

Apparent time at *London* of the

	d.	h.	′	″
Beginning at Sun-riſing, 1748, *July*	13	20	26	29
Central Eclipſe begins at Sun-riſing		21	40	34
Central *Eclipſe* in the Meridian		23	3	9
Central *Eclipſe* in the Nonageſime Degree		23	19	49
Middle, being at — —		23	25	7
End of the Central *Eclipſe*, at Sun-ſetting		1	9	40
End at Sun-ſetting —		2	23	45
Duration —		5	57	16

The Latitudes and Longitudes where thoſe Appearances happen, are,

	Lat. °	′		Long. °	′	
Sun begins to be *Eclipſed* at his Riſing	35	9	N.	51	10	W.
Riſes Centrally *Eclipſed*	45	23		76	17	
Centrally *Eclipſed* in the Meridian	51	38		14	13	E.
Centrally *Eclipſed* in the Nonageſime	48	47		20	8	
Sun ſets Centrally *Eclipſed*	10	30		76	22	
Ends at Sun-ſetting	0	14	S.	53	59	
Suns upper toucht by ☽'s lower Limb	21	19	N.	14	13	

Sun's lower toucht by Moon's upper Limb beyond the Pole.

CHAP.

CHAP. XVIII.

To find by the Terreſtrial Globe, the principal Appearances of Solar Eclipſes.

1. GIVEN the Cuſp of the Aſcendant, with the Angle Orient, or Altitude of the Nonageſime Degree, to find where the Sun riſes as the Eclipſe begins.

EXAMPLE.

Let it be required to find the principal Appearances of the Sun's Eclipſe, *July* 24, 1739?

Solution. I. *For the Latitude.*

Bring the Sun's Place ♌ 11° 33′ to the Eaſtern Horizon, and there ſtay the Globe: Then take 3 Signs from the Sun's Place, and there remains ♉ 11° 33′ for the Place of the Nonageſime Degree, which mark with a Chalk in the Ecliptic.

Then move the Brazen Meridian in the Notches of the Wooden Horizon, until the Place of the Nonageſime Degree be elevated 58° 5′; then will the Notch of the Northern cut the Brazen Meridian at 45° 11′, the Latitude of the Place North.

2. For the Difference of Meridians, or Longitude from *London*.

Bring the Sun's Place in the Ecliptic ♌ 11° 33′ to the Brazen Meridian, and there make a Mark with Chalk: Let the Globe be elevated to the Latitude of the Place juſt now found; bring *London* to the Meridian, and ſet the Index to the Time of the Eclipſe 1 h. 11′.

Now move the Globe, till the Index point at 12 at Noon; and that Place on the Globe under the Mark made on the Brazen Meridian, is the Place where the Sun is Vertical at that time; bring this Place to the Eaſtern Horizon, and the

the Meridian cuts the Equator in 125° 58′ Weſt of *London*; which Place is in the unknown Ocean, where the Sun will begin to riſe juſt as the Eclipſe begins.

---

2. To find the Place where the Sun will Riſe *Centrally Eclipſed*.

1. For the Latitude.

The Sun's Place is *Leo* 11° 38′, the Altitude of the Nonageſime Degree 23° 1′, and the time at *London* 3′ paſt 3.

SOLUTION.

Bring the Sun's place in the *Ecliptic* ☌ 11° 38′ to the Eaſtern Horizon; then 3 Signs ſubtracted from it, leaves ♉ 11° 38′, the place of the Nonageſime Degree; which mark with Chalk. Then move the Meridian in the Notches of the Horizon, till you have the place of the Nonageſime ♉ 11° 38′ elevated upon the Quadrant of Altitude 23° 1′; then will the Notch of the Northern Horizon cut the Meridian at 71° 23′, which is the Latitude of the place ſoughr.

2. For the Difference of Longitude.

Bring the Sun's Place to the Brazen Meridian, and there mark the Meridian with Chalk; elevate the Globe to the Latitude of the Place juſt found; bring *London* to the Meridian, and ſet the Index to the time of the *Eclipſe* 3′ paſt 3; move the Globe, till the Index point at 12 at Noon: Here ſtay the Globe, and obſerve what place is under the Mark made on the Brazen Meridian; for there the Sun is Vertical at the given Time.

Bring this place (being marked with Chalk) to the Eaſtern Horizon, and the Degree of the *Equator* 156° 13′ that now lies under the Brazen Meridian is the Longitude of the place ſought; Which place falls on the Globe, in the unknown Ocean; where the Sun will be ſeen to riſe Centrally *Eclipſed*, it being in the Zenith, or higheſt part of the Globe at that time.

3. To

3. To find where the Sun is *Centrally Eclipſed* in the Nonageſime Degree.

1. For the Latitude.

Sun's Place ♌ 11° 40′, the Altitude of the Nonageſime Degree 16° 22′ and the time at *London* is 49′ paſt 3 in the Afternoon.

SOLUTION.

Mark the Sun's Place in the *Ecliptic* ♌ 11° 40′. This is now the place of the Nonageſime Degree. To it add three Signs, and it makes ♍ 11° 4′ for the Cuſp of the Aſcendant; which bring to the *Eaſtern* Horizon, and move the Brazen Meridian in the Notches of the Wooden Horizon, until the Nonageſime Degree (Sun's place) *Leo* 11° 40′ be elevated 16° 22′ upon the Quadrant of Altitude; then doth the Notch of the North Horizon cut the Meridian in 74° 33′, the Latitude of the place North.

2. For the Difference of Longitude.

The Globe ſtanding elevated to the Latitude 74° 33′, as found above, mark the Sun's place in the *Ecliptic Leo* 11° 40′, bring that to the Meridian, and ſet the Index to 12 at Noon; then move the Globe, till the Index points at the given Hour at *London* 3 h. 49′ P. M. The Degrees of the *Equator* now under the Brazen Meridian 191° 24′ are the Right Aſcenſion of the Mid-Heaven at *London*; which mark with Chalk: Then to the Sun's Place ♌ 11° 40′ add three Signs, the Sum is ♍ 11° 40′.

This Point of the *Ecliptic* doth not Aſcend, [See *Page* 254] in that Latitude; for which reaſon the Globe cannot decide the Controverſy.

4. To find the Place on the Globe, where the Sun is *Centrally Eclipſed* in the Meridian.

1. For the Latitude.

Given the *Sun's* place ☌ 11° 38′, and the Altitude of the Nonageſime Degree 21° 10′, with the Nonageſime Degree ♎ 23° 26′.

SOLUTION.

To the Place of the *Nonageſime Degree* add three Signs; the Sum is ♑ 23° 26′, the Cuſp of the Aſcendant. Bring this to the *Eaſtern* Horizon, and move the Brazen Meridian in the Notches of the Wooden Horizon, until the place of the *Nonageſime Degree* ♎ 23° 26′ cut the Quadrant of Altitude in 21° 10′; then doth the Northern Notch of the Horizon cut the Brazen Meridian in 86° 34′ North beyond the Pole for the Latitude of that place.

2. For the Difference of Longitude.

SOLUTION.

Bring *London* to the Meridian, and ſet the Index to the given time of the *Eclipſe* 3 h. 18′: Then move the Globe till the Index points at 12 at Noon.

Now the Degrees of the *Equator* under the Brazen Meridian are 49° 32′, which is the Longitude of the place to the Weſt of *London*, where the Sun will be *Centrally Eclipſed* in the Meridian, and Latitude 86° 34′ *North* beyond the Pole.

5. To

5. To find the Place where the Sun ſets *Centrally Eclipſed.*

1. For the Latitude.

Given the Sun's Place ♌ 11 degr. 41 min. the Apparent time 4 h. 15′ P.M. and the Altitude of the Nonageſime Degree 11 degr. 39 min.

SOLUTION.

Becauſe in this Caſe the Sun is ſetting, bring his Place *Leo* 11 degr. 41 min. to the Weſtern Horizon; add three Signs to it, and you have the Place of the Nonageſime Degree ♏ 11 degr. 41 min.

Then move the Brazen Meridian in the Notches of the Horizon, until you bring the Nonageſime Degree ♏ 11 deg. 41 min. to be elevated upon the Quadrant of Altitude 11 degr. 39 min. equal to the Angle Orient: Then obſerve what Degree of the Brazen Meridian is cut by the Notch of the Wooden Horizon; for that is the Latitude, or Pole's Elevation ſought, which in this Example is 56 degr. 35 min. North.

2. For the Difference of Longitude.

Bring the Sun's Place in the Ecliptic *Leo* 11 degr. 41 min. to the Brazen Meridian, and over the Sun's place make a Mark on the Meridian, the Globe being elevated to the given Latitude 56 degr. 25 min. *North*; bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 4 h. 15′ P.M. Move the Globe, till the Index point at 12 at Noon. Here ſtay it, and obſerve what Place lieth under the Mark made on the Meridian (for that is the place where the Sun is Vertical at the given time) which is the Eaſt End of *Hiſpaniola.* Bring this place to the Weſtern Horizon, and the Degrees of the Equator,

Now,

Now, under the Meridian are 54° 14′, the Longitude Eaſt of *London*; the Place now in the Zenith is the Eaſt *Moſcovia*, where the Sun will ſet *Centrally Eclipſed.*

---

6. To find the Place where the *Eclipſe* ends at Sun-ſetting.

Given the Sun's Place ♌ 11° 45′, the Apparent time at *London* 6 h, 8′ 59″ P. M. and the Altitude of the *Nonageſime Degree* 46° 43′.

1. For the Latitude of the Place.

Becauſe the Sun is ſetting, bring his place in the *Ecliptic* ♌ 11 degr. 45 min. to the Weſtern Horizon; add three Signs to it, and you have the place of the *Nonageſime Degree* ♏ 11 degr. 45 min.

Then move the Brazen Meridian in the Notches of the Wooden Horizon, until you bring the *Nonageſime Degree* ♏ 11 degr. 45 min. to be elevated upon the Quadrant of Altitude 46 degr. 43 min. equal to the Angle Orient, or Altitude of the *Nonageſime Degree*. Then obſerve what Degree of the Meridian is cut by the *Northern Notch* of the Wooden Horizon; for that is the Latitnde or Poles Elevation ſought, which in this Example is 25 degr. 48 min. *North.*

2. For the Difference of Longitude from *London.*

Bring the Sun's place in the *Ecliptic* ♌ 11° 45′ to the Brazen Meridian, and there on the Meridian make a Mark. The Globe being elevated to the juſt now found Latitude 25 degr. 48 min. *N.* bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 6 h. 8′ P. M. Move the Globe back, till the Index point at 12 at *Noon.*

Here ſtay it, and obſerve what Degree of the *Equator* is under the Brazen Meridian; for that is the place where the Sun is Vertical at the given time, which is the Gulph of *Mexico* in *America.*

Bring

Bring this Place to the Weſtern Horizon; and the Degree of the Equator then under the Meridian is 6° 39′ Eaſt Longitude from *London*. Now look upon the Zenith of the Globe, and you will find *Techort* in *Barbary*; at which place the Eclipſe will end at Sun-ſetting.

Thus have I fully demonſtrated by the Terreſtrial Globe all the Appearances of this Solar Eclipſe, which are all that can happen; becauſe all the Penumbra doth not fall within the Earth's Disk. But in thoſe Eclipſes, when the Penumbra is all involved in the Disk, then there will be two more Caſes (as in the Sun's Eclipſe *December* 28, 1730,) that is, firſt, to find the Place where the Eclipſe is at Sun-riſing; and the other is, to find the Place where the Eclipſe begins at Sun-ſetting. Of theſe in their Order.

---

1. To find by the Terreſtrial Globe, the Place where the Sun's Eclipſe of *Dec.* 28, 1730, ended at Sun riſing.

	d.	h	′	″
Given the Apparent Time at *London*, *Dec.*	28	21	25	34
Sun's Place —	♑	17	43	0
Altitude of the *Nonageſime Degree*		90	48	0

1. For the Latitude of that Place.

SOLUTION.

Bring the Sun's Place in the Ecliptic ♑ 17 degr 43 min: to the Eaſtern Horizon (becauſe the Sun is riſing) and from it ſubtract three Signs, and you will have ♎ 17 degr. 43 min. for the Place of the *Nonageſime Degree*.

Then, becauſe its Altitude is 90 degr. 48 min. from the North Part of the Horizon (becauſe the Sum of the third Angle of Incidence 85 degr. 11 min. and the Angle of the Moon's Way 5 degr. 37 min. is more than a Quadrant) move the Braſs Meridian in the Notches of the Wooden Horizon, until the Place of the *Nonageſime* ♎ 17 degr. 43 min. be elevated 90 degr. 48 min. from the North part of the Horizon, or 89 degr. 12 min. from the South part thereof; then the Degrees cut by the Southern Notch of the Horizon upon the Braſs-

Braſs-Meridian, are 7 degr. 41 min. which is the Latitude of the Place South.

2. For the Difference of Longitude from *London*.

The Globe being elevated to the Latitude of 7 degr. 41 min. South, juſt now found, bring the Sun's Place in the Ecliptic ♍ 17° 43′, to the Brazen Meridian; make a Mark; then bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 21 h. 26′ *P. M.* Move the Globe, till the Index point at the upper 12, or Noon.

Now the Place on the Globe under the Meridian, which you mark'd, is the Sea betwixt the Kingdom of *Moniotapa* in South *Africa* and *Madagaſcar*. Here the Sun is Vertical at the given Time. Bring this Place to the Eaſtern Horizon (becauſe the Sun is riſing) and obſerve the Degrees of the Equator under the Meridian, which in this Example are 54 degr. 33 min. Weſt Longitude from *London*.

Now, as the Globe ſtands, look on the Zenith, and you will ſee the Country of the Amazons in South *America*; to which place the Eclipſe ends at Sun-riſing.

This is the moſt Weſterly Place that ſees the Eclipſe.

---

2. To find the Place on the Globe where the Eclipſe begins at Sun-ſetting.

Given, the Apparent Time at *London* 22 h. 59 min. 38″, the Sun's Place ♍ 17 degr. 47 min. and the Altitude of the *Nonageſime Degree* 79 degr. 34 min.

1. For the Latitude.

SOLU-

SOLUTION.

Bring the Sun's Place ♍ 17° 47′ to the Weſtern Horizon (becauſe the Sun is ſetting) and to it add three Signs, and you will have ♈ 17° 47′ for the Place of the *Nonageſime Degree*. Then, becauſe its Altitude is 79 degr. 34 min. move the Braſs Meridian in the Wooden Notches of the Horizon, until the Place of the *Nonageſime Degree* ♈ 17° 47′ be elevated 79° 34′ from the South Horizon.

Now, the Degrees cut by the *Northern Notch* of the Wooden Horizon, are 16 degr. 36 min. and ſuch is the Latitude *North*.

2. For the Difference of Longitude.

The Globe being elevated to the Latitude 16 degr. 47 min. *North*, juſt now found, bring the Sun's Place in the Ecliptic ♍ 17 degr. 47 min. to the Braſs Meridian, and there make a Mark exactly over the Sun's Place; then bring *London* to the Meridian, and ſet the Index to the time of the Eclipſe 22 h. 59′ 38″ *P. M.* Move the Globe, till the Index points at 12 at Noon, the Place under the Mark on the Meridian, is the Weſtern Coaſt of *Monapotapa* in South *Africa*. Here the Sun is Vertical at the given time.

Bring this Place to the Weſtern Horizon (becauſe the Sun is ſetting.) Here ſtay the Globe, and ſee what Degrees are on the Equator under the Mark on the Meridian; for they are the Longitude from *London*, and are 98 degr. 4 min. Eaſt.

Now look on the Zenith of the Globe, and you will ſee *Pegu* in the *Eaſt Indies*. This is the moſt Eaſtern Place that ſees any thing of this Eclipſe.

Becauſe the Solution by the Terreſtrial Globe, of finding the Places where the Sun is Centrally Eclipſed in the *Nonageſime Degree* is the moſt difficult, and my Deſign of Writing being to make all things plain to the meaneſt Capacity; therefore for the ſake of my younger Readers, I will add another Example, which ſhall be of the Sun Centrally Eclipſed in the *Nonageſime Degree*, *Anno* 1730, *December* 27th, 22 h. 12′ 42″; Sun's Place ♑ 17° 45′, and the Altitude of the *Nonageſime Degree* 87° 46′.

SOLUTION.

1. For the Latitude of that Place.

Mark the Sun's Place in the Ecliptic ♎ 17 degr. 45 min. This is now the Place of the *Nonageſime Degree*.

To it add three Signs, and it makes ♈ 17 degr. 45 min. for the Cuſp of the Aſcendant; which bring to the Eaſtern Horizon: Keep it there, and move the Braſs Meridian in the Notches of the Wooden Horizon, until the *Nonageſime Degree* (Sun's place) ♈ 17 degr. 45 min. be elevated upon the Quadrant of Altitude 87 degr. 46 min. from the South part of the Horizon; then doth the *South Notch* of the Horizon cut the *Braſs Meridian* in 20 degr. 2 min. South, the Latitude ſought.

2. For the Difference of Longitude.

The Globe ſtanding elevated to the Latitude 20 degr. 2 min. South, mark the Sun's place in the Ecliptic ♎ 17 degr. 45 minutes, which bring to the Meridian, and ſet the Index to 12 at *Noon*; then move the Globe till the Index point at the given Hour 22 h. 13 min. at *London*, the Degrees of the Equator now under the Meridian 262 degr. 24 min. are the Right Aſcenſion of the Mid-Heaven at *London*; which mark with Chalk. Then to the Sun's place add three Signs, the Sum is, ♈ 17° 45′. Bring this to the Eaſtern Horizon, and here ſtay the Globe; the Degrees of the Equator now on the Meridian are the Right Aſcenſion of the Mid-Heaven 286 degrees 55 minutes, the Place where the Sun is Centrally Eclipſed in the *Nonageſime Degree*; which mark in the Equator with Chalk: Alſo count the Degrees in the Equator between theſe two Chalks, and you will find them to be 26 degrees 30 minutes, the Difference of Longitude from *London* Eaſt; becauſe the time at *London* was more than 12 Hours; when it is leſs than 12 Hours, then it is Weſt.

How

How exceeding pleaſant muſt it be to the young Aſtronomer, to take the Terreſtrial Globe in his hand, and at one View to ſee the principal Appearances of any Solar Eclipſe! This, I ſay, is very ſatisfactory, by reaſon he may examine the Calculations, and by that means find out the Faults, if any.

CHAP. XIX.

Shewing how to obſerve the Phaſes of Venus *and* Mercury.

HE that underſtands what I have already wrote in my *Syſtem of the Planets demonſtrated*, cannot but rightly conceive the true Syſtem of the World, I mean, the Heavenly Bodies themſelves, and how they move in their ſeveral Orbits: For, ſince all the Planets, as well as our Earth, are Spherical, Opaque and Scabrous, or rough uneven Bodies, they do reflect every way the Sun's Rays which fall upon them.

And it follows alſo from hence, that one half of every Planet (nearly) or that Hemiſphere which is turned neareſt the Sun, will be illuminated by him, and the other Hemiſphere muſt remain in Darkneſs.

And becauſe the Orbits of the two inferiour Planets *Venus* and *Mercury* are inſcribed within the Earth's Orb, they increaſe and decreaſe in Light as our Moon doth: For when they are in Conjunction with the Sun in the upper part of their Orb, the ſame Face that they then ſhew to the *Sun*, is alſo turned to our Earth, which is full, except when they are in, or near the Nodes, and then they are behind the *Sun*, and conſequently cannot be ſeen by a Spectator on our Earth; that is, if their Latitudes be leſs than the *Sun*'s *Semidiameter*.

Such a Conjunction as this happen'd of the *Sun* and *Mercury*, *Anno* 1693, *October* 29, at 32′ 50″ paſt Noon in ♏ 16° 52′ 7″, with Latitude 4′ 57″ *S. A.*

This Conjunction, *J. Wing* put in his Almanack for that Year, with the Calculation, to ſhew the Paſſage of *Mercury* over the Sun's Disk. Indeed, if he could have jump'd into either *Saturn* or *Venus* at that time, he might then have ſeen *Mercury* as a black Spot in the Sun: For as *Mercury* was then in *Scorpio*, ſo were *Saturn* and *Venus* in *Sagittary*; ſo that an Eye from either of them might have ſeen *Mercury* in the Sun.

I mention this, only as a Caution to young Students, that they may not fall into the like Error, as he did.

In Page 426, of Vol. I. of my *Syſtem*, I have taught how to Calculate a Retrograde Conjunction of *Mercury* or *Venus* over the Sun: But becauſe that differs ſomething from a Direct Conjunction, it will not, I believe, be taken amiſs if I ſhew here how it is to be done.

All the difference is, in finding the Diſtance of the Planet from the Earth, at the time of the true Conjunction: For as in the Retrograde Conjunction the Angle of the Sun is always 6 Signs; and the Diſtance of *Mercury* from the Sun is ſubtracted from the Diſtance of the Sun from the Earth; ſo in the Direct Conjunction the Angle at the Sun is nothing: The Diſtance of *Mercury* from the *Sun* is added to the Diſtance of the Sun from the Earth; and that Sum is the Diſtance of *Mercury* from the Earth; (the like in *Venus*.)

To make it more intelligible, take a Synopſis of the Calculation of the Conjunction above mentioned, as it happens from my Tables.

Equal

		d.	h.	′	″
Equal time of true Orbit ♂ 1693, Oct. 26		29	0	32	30
Equation of time add	——			15	52
Apparent Time	——	29	0	48	42

	☉ S.	°	′	″	☿ S.	°	′	″
Mean Anomaly of	4	10	44	31	10	22	21	40
Mean Longitude	7	18	21	28	7	4	59	40
Proſthapheresis ſub.		1	29	21	+	11	52	27
Orbit Place	7	16	52	7	7	16	52	7
Mercury's North Node ſub.	—	—	—	—	1	14	42	12
Argument of Latitude	—	—	—	—	6	2	9	55
Angle at the Sun	0	0	0	0	—	—	—	—
Inclination of the Orb	—	—	—	—		0	15	48

For the Latitude of *Mercury*.

Diſt. ☉ à ☊	98912″	4.995230
Diſt. ☿ in his Orbit à ☉ add	45513	4.658138
Diſt ☿ à ☊	144425	5.159642
As Diſt. ☿ à ☊	144425 Co Ar.	4.840358
To Diſt. ☿ à ☉	45513	4.658138
So *s.* Inclinat.	0° 15′ 48″	7.662244
To *s.* Geocen. Lat. S.A.	0 4 57	7.160740

That my Reader may have a right Idea of theſe matters, I will give him another Example of the Conjunction of the Sun with *Venus* Direct, *Anno* 1735, when ſhe will paſs below the Sun 45′ 16″. See a Synopſis of the Calculation, and mark it well.

	d.	h.	′	″
Equal time of the true Eclipt. ☌ 1735, *Jan.*	8	21	8	0
Equation of time ſub.			11	33
Apparent time	8	20	56	27

	☉ S.	°	′	″	♀ S.	°	′	″
Mean Anomaly of	6	20	54	37	11	22	49	49
Mean Longitude	9	29	14	52	9	29	54	16
Proſthapheresis add		0	42	20		0	5	58
Orbit Place	9	29	57	12	10	0	0	14
Venus's North Node	--	--	--	--	2	14	15	58
Argument of Latitude	--	--	--	--	7	15	44	14
Reduction ſub.	—	—	—				3	
Ecliptic Place	9	29	0	0	27	11	0	0
Angle at the Sun	0	0	0	0	—	—	—	—
Inclination of the Orb	—	--	--	--		2	25	34

For the Latitude of *Venus*.

Diſt. ☉ à ☋	98423″	4.993098
Diſt. ♀ à ☉ curtat. add	72183	4.858435
Diſt. ♀ à ☋	170606	5.231994

As Diſt. ♀ à ☋	170606 Co Ar.	4.768006
To Diſt. ♀ à ☉	72183	4.858435
So *t.* Inclination	2° 25′ 34″	8.627045
To *t.* Geocen. Lat. S.A.	1 1 37	8.253486
Sum Semidiam. ſub.	16 21	
Venus below the Sun	45 16	

Now

Now ſhe ſhews a full Face to the Earth, which I ſhall call 12 Digits (as in the Luminaries;) and all the time from this, to her Retrograde Conjunction with the Sun, the Light will be decreaſing, until ſhe come to her Retrograde Conjunction; and then her dark Hemiſphere being turned towards us, becauſe now ſhe is in a right Line, if the Sun be in her Node, or ſo near it, that her Latitude be leſs than the Sun's Semidiameter at that time, ſhe will appear a black Spot in the Sun's Diſk.

And from this Conjunction, to her Direct Conjunction again, ſhe is encreaſing in Light, is horned, biſſected and gibbous, but on the reverſe ſide to what ſhe was before, in going from the Direct to the Retrograde Conjunction.

What I have here ſaid of *Venus*, holds good alſo in *Mercury*. So, by underſtanding well what goes before, it is eaſy at all times to know what Phaſe or Face either of theſe Planets will put on before, or when you look at them: For ſubtract the Sun's Place from the Heliocentric Place of *Venus* or *Mercury*, and if the Diſtance be leſs than 90°, or three Signs; or more than ſix, or leſs than nine, ſay,

As Radius,
To 12 Digits;
So is the Co-Sine of half the Diſtance of the Planet from the Sun,
To the Digits and Decimal Parts of a Digit then light. See the *Scheme* in Page 66.

But if the Diſtance be more than three *Signs*, or leſs than nine, ſay,

As Radius,
To 12 Digits light;
So is the *Sine* of half the Diſtance of the Complement to 6 *Signs*,
To the Digits and Decimal Parts light.

A Table *of the light Digits of* Venus *and* Mercury

Dist. ♀ & ☿ à ☉ S.	°	Digits light.	Dist. ♀ & ☿ à ☉ S.	°
0	0	12.	0	12
0	10	11.95	20	
0	20	11.83	10	
1	0	11.59	0	11
1	10	11 28	20	
1	20	10.88	10	
2	0	10.39	0	10
2	10	9.83	20	
2	20	9.193	10	
3	0	8.485	0	9
3	10	7.713	20	
3	20	6.883	10	
4	0	6.	0	8
4	10	5.027	20	
4	20	4.104	10	
5	0	3.105	0	7
5	10	2.094	20	
5	20	1.046	10	
6	0	0.	0	6

Af

After this manner have I calculated the foregoing Table; which ſhews, that in the firſt *Semicircle* of their Diſtance from the *Sun*, their Digits of Light decreaſe; and in the other *Semicircle*, that is, from 6 to 12 *Signs* of their Diſtance from the *Sun*, the Light increaſeth.

But here it is to be remember'd, that in the firſt *Semicircle* of their Diſtance from the *Sun*, they are Occident, and therefore may be obſerved in the Evening after Sun-ſet.

But if the Diſtance of the Planet be more than 6 *Signs*, then they are Orient, and conſequently muſt be view'd in the Morning before Sun-riſing.

But here we muſt take care that we be not deceiv'd by the general Conſideration of her Phaſes only, ſo as to think that *Venus* will always appear bright and largeſt: For ſuppoſe the Earth at P, and *Venus* at ♀ in the firſt Triangle, Page 66; tho' *Venus* will then ſhine with a full Face; yet ſhe will be then ſo far from the Earth, that her Diſtance from us will more than compenſate for the Quantity of her Light.

Wherefore you may expect to ſee her moſt bright and ſplendid about her greateſt Elongations. See the Figure, Page 47.

And ſince her ſhining, or apparent Light increaſes in a duplicate Ratio; or as the Square of her Diſtance from us diminiſhes, her Light will be much more increaſed by her Approach to the Earth, than it will be leſſen'd by our ſeeing leſs of her illuminated Disk.

So that the Table above ſhews her true Light at ſuch a Diſtance from the *Sun*, but will ſometimes differ from the apparent Light, for the reaſon juſt now given.

Nothing remains now, but to ſhew how to obſerve the Phaſes of *Venus* and *Mercury* with a Teleſcope.

In order hereunto, you muſt be provided with a Teleſcope 14, 16 or 20 Foot, and be ſure that the Glaſſes be well proportion'd to the length of the Tube.

Then you muſt provide an Aperture (which is a Word in Opticks) that is nothing elſe but a piece of fine Gard or Paſtboard cut round, juſt the bigneſs of the Object Glaſs, with a round Hole in its Center, about two tenths of an Inch Diameter, for a Glaſs 14 Foot long. Put this on the Inſide of the Object Glaſs cloſe to it, when you would obſerve the Phaſes of theſe Planets, and you will have your End anſwer'd.

Note, The Hole in the Paſteboard, or Aperture, is beſt made with a round hot Iron; otherwiſe it will be difficult to make the round.

Thro' this Hole in the Aperture the Image of the Object comes into the Tube, and thence is carry'd to the Eye.

Mr. *Auzout* ſaith, he found, that the Apertures of Teleſcopes ought to be nearly in a ſubduplicate proportion of their Lengths.

This is only a *French* Notion: For what he means, is beſt known to himſelf. This I can aſſure you, that the beſt way of fitting the Aperture to the Teleſcope, is by Trial; for a ſubduplicate Proportion is no more than as 2 to 4, or as 5 to 10, *&c.*

The viſible Area of an Object is not increas'd or diminiſh'd by the greater or leſſer Aperture of the Object-Glaſs: All that is effected thereby, is the admittance of more or leſs Rays, and conſequently the more bright or obſcure Appearance of the Object.

When you look at *Venus* thro' a Teleſcope, you muſt uſe a much leſs Aperture than for the Moon, *Jupiter* or *Saturn*; becauſe her Light is ſo Vivid and Glaring.

The Table that I have here given, with Practice is the only Guide you can have for proportioning an Aperture to your Teleſcope: For if the Obſervation agrees with the Table, according to the Planet's diſtance at that time from the Sun, then the Aperture and Teleſcope are rightly proportioned, elſe not; and ſo by Trials you muſt make it bigger or leſſer, till you find a Concurrence.

Anno 1734, *Feb.* 28, at 6 Hours P.M. I obſerv'd *Venus* with my 13 ½ Foot Glaſs, and an Aperture as above deſcrib'd, to have ſomething more than 1 Digit and half Light.

Venus's Heliocentric Place was then 5 Signs, 6° 11″ 58″, and the Sun's Place 11ſ. 20° 58′ 36″; her Diſtance from the Sun was 5ſ. 15° 13′ 22″, which in the Table gives 1.546 Digits light, agreeing exactly with Obſervation.

The Moon at the ſame time was in ♓, juſt paſt her *Perigeum*, with 5.034 Digits increaſing in Light.

To

To be a Compleat Aſtronomer is the greateſt Ornament that it's poſſible Man can be adorned with. Certainly nothing brings him nearer to his Creator, than to contemplate upon the Works of the Great *Jehovah*. 'Tis indeed an *Herculean* Task to arrive at any tolerable Knowledge of the Fabrick of the Univerſe: But if he finds the ineſtimable Gem, it makes a ſufficient Compenſation for all his Time and Coſt.

To underſtand the Site of the Earth and Sea, and to compute the true Diſtances upon the Terraqueous Globe, is very wonderful, uſeful and pleaſant: But this is nothing to what pleaſure the Heavens afford us; there is room to entertain the Minds of the boldeſt Thinkers: For what can be more ſatisfaction to the Aſtronomer, than to point out the Times and Places in the Heavens of a Conjunction, Eclipſe, Comet, *&c.* and to ſhew on what part of the Globe they ſhall be moſt ſeen, and where not at all!

This, I ſay, is very aſtoniſhing to the Ignorant, and thoſe unlearned in this ſublime Study; but much more to thoſe skill'd in this Science, to ſee how their Lines and Numbers agree with the Inequalities in the Planets Motions; which, by infallible Demonſtration teacheth the Diſtances, Magnitude, Motions, and Appearances of all the Celeſtial Bodies. The truth of all this cannot be made more evident, than by my Schemes of the Appearances of the Sarellites of *Jupiter*, which are now publiſhed, and ſold by my ſelf, and by all the Opticians in *London*; where any one that has but an ordinary Teleſcope, may be ſatisfied of the Truth hereof any Evening when *Jupiter* is Viſible; for thereby you will ſee if any of the Circumjovials are wanting, which of them it is, and where it is, whether in the Shadow of *Jupiter*, or between your Eye and his Body.

This is a Work ſo exceeding uſeful, that not any one who uſeth a Teleſcope, ought to be without, and which will be publiſhed Annually, if I meet with Encouragement.

And here I think it will not be taken amiſs, if I mention a a Paragraph of Dr. *Pemberton's*, in the 180th Page of a View of Sir *Iſaac Newton's* Philoſophy; becauſe it poſſibly doth not fall into every one of my Reader's hands.

" Upon

" Upon this (ſays he) I think, it is not improper to men-
" on a Reflection made by our Excellent Author (meaning
" Sir *Iſaac Newton*) upon theſe ſmall Inequalities in the Pla-
" nets Motions; which contains under it a very ſtrong Phi-
" loſophical Argument againſt the Eternity of the World.
" It is this, That theſe Inequalities of the Planets muſt con-
" tinually increaſe by ſlow Degrees, till they render at
" length the preſent Frame of Nature unfit for the purpoſes
" it now ſerves. And a more convincing proof cannot be
" deſir'd, againſt the preſent Conſtitution's having exiſted
" from Eternity than this, that a certain Period of Years will
" bring it to an End".

I am aware, this Thought of our Author's has been repreſented even as impious, and as no leſs than caſting a Reflection upon the Wiſdom of the Author of Nature, for framing a periſhable Work. But I think, ſo bold an Aſſertion ought to have been made with ſingular Caution. For if this Remark upon the increaſing Irregularities of the Heavenly Motions be true in Fact, as it really is, the Imputation muſt return upon the Aſſerter, that this doth detract from the Divine Wiſdom.

Certainly, we cannot pretend to know all the Omniſcient Creator's Purpoſes in making this World; and therefore cannot undertake to determine how long he deſign'd it ſhould laſt. And it is ſufficient if it endures the time intended by the Author. The Body of every Animal ſhews the unlimited Wiſdom of its Creator no leſs; nay, in many reſpects more, than the larger Frame of Nature; and yet we ſee, they are all deſign'd to laſt but a ſmall ſpace of time.

CHAP.

CHAP. XX.

Shewing how to Conſtruct Tables of the Angle Orient, *or Altitude of the Nonageſime Degree of Latitude North or South.*

FIRST, in any Latitude North, if *Aries* or *Libra* Aſcend, the Altitude of the Nonageſime Degree, or Angle Orient is gained by adding or ſubtracting the Obliquity of the Ecliptic to, or from the Complement of the Latitude of the Place, which is ever equal to the Elevation of the Equinoctial.

EXAMPLE.

In the Latitude of one Degree North, what is the Altitude of the Nonageſime Degree, when *Aries* and *Libra* Aſcend?

OPERATION.

	°	′
Latitude North 1°, Complement	89	0
Obliquity of the Ecliptic ſub. and add	23	29
Angle Orient when *Aries* Aſcends	65	31
Sum	112	29
From a Semicircle	180	0
Angle Orient when *Libra* Aſcends	67	31

EXAMPLE II.

In the Latitude of 20 Degrees, and *Aries* and *Libra* Aſcending, what's the Angle Orient?

OPERATION.

	°	′
Latitude 20°, Complement	70	0
Obliquity of the Ecliptic ſub. and add	23	29
Angle Orient when *Aries* Aſcends	46	31
Sum	93	19
From a Semicircle	180	0
Angle Orient when *Libra* Aſcends	86	31

EXAMPLE III.

In the Latitude of 66° 31′, and *Aries* and *Libra* Aſcending, what are the Angles Orient?

OPERATION.

	°	′	
Latitude 66° 31′, Complement	23	29	
Obliquity of the Ecliptic ſub. and add	23	29	
Angle Orient when *Aries* Aſcends	0	0	♈.
Angle Orient when *Libra* Aſcends	46	58	♎.

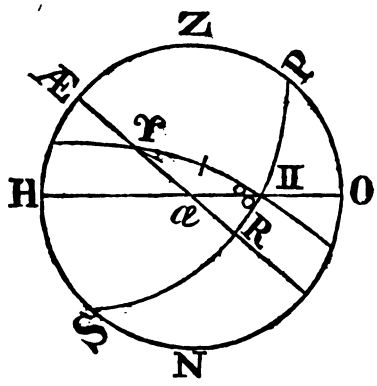
But when any other Degree of the *Ecliptic* Aſcends, then it will require the Solution of an Oblique-angled Spheric Triangle; which I ſhall fully explain in the following Examples.

EXAMPLE I.

In the Latitude of 51° 32′ North, when the firſt Scruple of ♊ or ♐ Aſcends, what is then the Altitude of the Nonageſime Degree?

OPERA-

OPERATION.



In the adjacent Scheme, let the Circle HZON repreſent the Meridian of the Place, HO the Horizon, ÆR the Equinoctial, ♈ II a part of the *Ecliptic*, being 60 degr. thereof, the Angle œ ♈ II, the Obliquity of the *Ecliptic* 23 deg. 29 min. and the Angle ♈ œ II 141 degr. 32 min. the Complement of the Angle H œ Æ 38 degr. 28 min. the Elevation of the Equinoctial in the given Latitude of *London* 51 degr, 32 min. North; to find the Angle ♈ II œ, equal to the Altitude of the Nonageſime Degree, or Angle Orient, which is formed by the *Ecliptic* ♈ II, and Horizon HO.

SOLUTION.

Firſt, Let fall the Perpendicular II R to cut the *Equinoctial* in R at Right Angles, and paſs thro' its Poles at P and S. Then in the Right-angled Spheric Triangle ♈ R II,

		o ′	
As *Ct.* ∠ R ♈ II	Obliquity	23 29	10.361044
To	Radius —	90 0	10.000000
So *C.S.* ♈ II	in the Ecliptic	60 0	9.698970
To *Ct.* ∠ ♈ II	R	77 45	9.336926

Secondly

Secondly,

	° ′		
As *C.S.* ∠ R ♈ ♎ Obliquity	23 29	Co. Ar.	0.037547
To *C.S.* ∠ ♈ ♌ ♎ Co-Latit.	38 28		9.893645
So *S.* ∠ ♈ ♎ R	77 45		9.989997
To *S.* ∠ ♌ ♎ R ſub.	56 31		9.921189
Rem. ∠ ♈ ♎ ♌ ∠ Orient	21 54	when ♎ or ♒ A-	(ſcends.

Secondly Without letting fall the Perpendicular ♎ R.

OPERATION.

To find the Side ♌ ♎.

	° ′		
As *S.* ∠ ♈ ♌ ♎ Co Latitude	38 28	Co Ar.	0.206168
To *S.* Cr. ♈ ♎ in the Ecliptic	60 0		9.937531
So *S.* ∠ ♌ ♈ ♎ Obliquity	23 29		9.600409
To *S.* Cr. ♌ ♎ in the Horizon	33 42		9.744108
Side ♈ ♎	60 0		

	° ′		° ′		° ′
Difference	26 18	Sides ♈ ♎	60 0	∠ ♈ ♌ ♎	141 32
Half	13 9	♌ ♎	33 42	♌ ♈ ♎	23 29
		Sum	93 42	X	118 3
		Half	46 51	Half	59 1½

Now ſay,

	° ′		
As *S.* half X crs. ♈ ♎ & ♌ ♎	13 9	Co Ar.	0.643016
To *S.* half Z	46 51		9.863064
So *S.* half X of ∠ ∠	59 1½		10.221513
To *C.S.* half reqd. ∠ ♈ ♎ ♌	10 37		10.727593
Doubled, is ∠ ♈ ♎ ♌	21 14	Angle Orient, as before.	

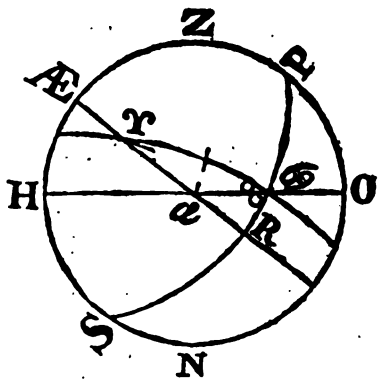
The

The ſame method of Solution has been obſerv'd in framing the following Tables, having particular regard to the Latitude of the Place, and Degree Aſcending: Which Tables if you compare with the Globe, you will there ſee how the Numbers come to break off in the Artic Circle, &c.

However, to make the Work more plain, I ſhall here add another Example or two.

EXAMPLE II.

In the Latitude of *London* 51° 32′ North, when the Cuſp of *Capricorn* Aſcends, I would know the Altitude of the Nonageſime Degree?



PROJECTION.

With the Chord of 60 degr. draw the Primitive Circle, which ſhall here repreſent the Meridian of the Place.

Quarter it, and draw HO for the Horizon, Z for the Zenith, and N for the Nadir. Becauſe the Amplitude at *London* in *Cancer* and *Capricorn* is 39 degr. 50 min. take the Semi-Tangent thereof, and ſet it from Œ to ♋; then take the Chord of 51 degr. 32 min. and ſet it on the Meridian from O to P, and from H to S; ſo ſhall P be the North Pole, and S the South.

To the three Points P ☋ and S find a Center, and draw the Hour-Circle P ☋ S; make Z Æ = to O P, the Latitude of *London*, and draw Æ ∝ R for the Equinoctial.

Then becauſe the Oblique Aſcenſion of the Aſcendant at *London* is 56 degr. 51 min. when *Cancer* Aſcends, from Æ ∝ a Quadrant = 90 degr. ſubtract the Oblique Aſcenſion 56 degr. 51 min. from 90 degr. and the Remainder 33 degr. 9 min. is the Diſtance of ♈ from the Meridian Æ.

Therefore take the Secant of 33 degr. 9 min. and draw the Vertical Circle Z ♈ N; the Oblique Circle P ☋ S is alſo the Solſtitial Colure, and cuts the Ecliptic ♈ ♎ at Right Angles in ☋, and the Equinoctial in Right Angles in R.

Therefore in the Obliqne-angled Spheric Triangle ♈ ☋ ∝ there are known ♈ ☋, a Quadrant or 90°, the Angle ∝ ♈ ☋ 23° 29′ = to the Obliquity of the Ecliptic, and the Angle ♈ ∝ ☋ the Complement of the Latitude 38° 28′, to find the Angle ∝ ☋ ♈ made by the Ecliptic and Horizon, which is the Angle Orient, and is what we are ſeeking.

SOLUTION.

By letting fall the Perpendicular ☋ R, there are form'd two Right angled Spheric Triangles, *viz.* ♈ R ☋, and ∝ R ☋, both Right-angled at R; and the firſt is a Quadrant; becauſe R ☋ being the Solſtitial Colure, paſſeth thro' both the Poles of the Equinoctial and Ecliptic, and therefore by the Laws of Sphericks cuts them both at Right Angles And becauſe equal Sides ſubtend equal Angles, therefore ♈ R is alſo a Quadrant; for Triangles, mutually equal in themſelves, are alſo equiangular.

1. To find ∝ ☋.

	°	′	
As S. ♈ ∝ ☋ Elevat. Equinoct.	38	28	9.793832
To S. ♈ ☋ Longitude	90	0	10.000000
So S. ∠ ∝ ♈ ☋ Obliquity	23	29	9.600409
To S. ∝ ☋ in Horizon = Amplit.	39	50	9.806577

Now

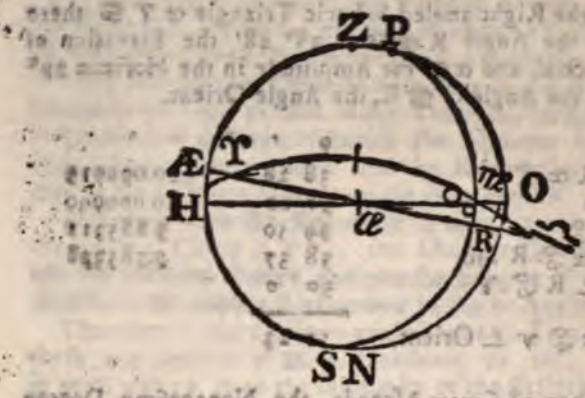
Now in the Right-angled Spheric Triangle ♌ ♈ ♑ there are given, the Angle R ♌♑ = 38° 28′ the Elevation of the Equinoctial, and ♌♑ the Amplitude in the Horizon 39° 50′, to find the Angle ♈♑ R, the Angle Orient.

	°	′	
As *C.s.* ∠ R ♌ ☊	38	28	10.099918
To Radius	90	00	10.000000
So *C* S ♌ ☊	39	50	9.885318
To *C.t* ∠ ♌ ☊ R ſub.	58	37	9.785398
From the ∠ R ☊ ♈	90	0	
Rem. ∠ ♌ ☊ ♈ ∠ Orient	52	23	

Note, When 0° *Cancer* Aſcends, the Nonageſime Degree is in ♈ 0°, and lieth Eaſt of the Meridian; but when *Capricorn* Aſcends, then the Nonageſime Degree is *Libra*, and lieth to the Weſt of the Meridian. View the Globe, and that will ſatisfie your Curioſity.

EXAMPLE III.

In the Latitude of 81 degr. North, and 9 degr. ♍ Aſcending, I demand the Angle Orient, or Altitude of the Nonageſime Degree?



In this Scheme, in the Triangle ☌ ♍ ♎, let the Perpendicular be an Hour-Circle P ♍ S, to cut the Equinoctial at Right Angles in R.

Then in the Rect angled Triangle ♍ R ♎ are known ♍ ♎ 21 degr. and the Angle at ♎ 23 degr. 29 min. to find the Angle K ♍ ♎.

	°	′	
As *C. t.* ∠ ♍ ♎ R Obliquity	23	29	10.362044
To Radius	90	00	10.000000
So *C S.* ♍ ♎ Longitude	21	0	9.970155
To *C. t.* ∠ K ♍ ♎	67	55	9.680111

Then ſay, By the Homogeneal Parts,

	°	′		
As *C.S.* ∠ ♍ ♎ R Obliquity	23	29	Co Ar.	0.037547
To *C.S.* ∠ ♍ ☌ R Co Latit.	9	0		9.994620
So S ∠ R ♍ ♎ laſt found	67	55		9.966910
To S. ∠ ☌ ♍ R	86	16		9.999077
Add ∠ R ♍ ♎	67	55		
Z = ∠ ☌ ♍ ♎ ſub.	154	11		
From —	180	0		
Rem. ∠ Υ ♍ ☌ ∠ Orient	25	49		

It

It may alſo be ſolved in the Triangle ♈ ♑ ☉.

In the Latitude of 66 degr. 31 min. North, and 0° *Cancer* Aſcending (or more properly ſpeaking) Deſcending, the Ecliptic Circle lieth exactly in the Horizon, and conſequently hath no Elevation; as you will ſee, if you look into the Tables of the Angle Orient againſt *Cancer* 0°. and under Latitude 66 degr. 31 min. it is blank; but if you move the Globe Weſtward, until 0° *Libra* Aſcend, the Angle Orient will be then 46 degr. 58 min. which is the double of the Obliquity of the Ecliptic.

From which it is plain, that within the Polar Circles ſome doubtful Caſes will ariſe; becauſe a great part of the Ecliptic doth Aſcend in a Moment of time.

As, for inſtance; In the Altitude of 67 degr. 37 min. North, let *Cancer* 22 degr. 17 min Aſcend, the Angle Orient will be 15 degr. 13 min.; and when *Capricorn* 22 degr 17 min. Aſcends, the ſame Angle will be 3 degr. 29 min. In the firſt Caſe, the firſt Point of *Cancer* never ſets; and in the latter, the firſt Point of *Capricorn* never riſes.

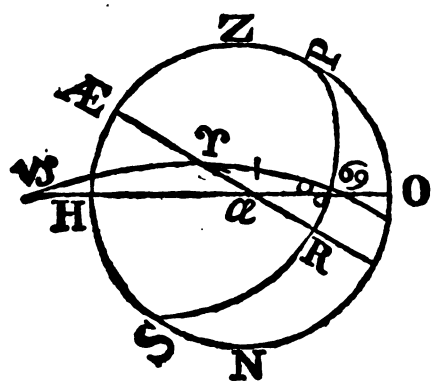
But let the South Pole be elevated, as before, and the Aſcendant the ſame, *viz*. *Cancer* 22 degr 17 min then the *Angle Orient* is 3 degr. 29 min and *Cancer* never riſes. But if *Capricorn* 22 degr. 17 min. Aſcend, the *Angle Orient* is 15 degr. 13 min. and the firſt Point of *Capricorn* never ſets, as is made more plain in the following Work.

EXAMPLE.

Latitude 67 degr. 37 min. North, Aſcendant *Cancer* 22 degr. 17 min. what's the *Angle Orient*?

OPERATION.

In the Oblique-angled Spheric Triangle ♈ ♋ ♋, the Angle is Obtuse, and therefore doubtful.

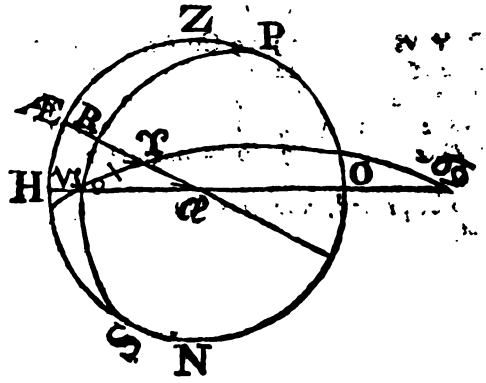


	° ′	
As C.s. ∠ ♋ ♈ ♋	23 29	10.362044
As Radius	90 00	10.000000
So C S. ♈ ♋	67 43	9.578853
To C.s. ∠ ♈ ♋ R	80 39	9.216809
From —	180 0	
∠ ♈ ♋ R	99 21	

Now say,

As C.S. R ♈ ☉	23 29	Co A.	0.037547
To C.S. ♈ ☉	22 23		9.965980
So S. ♈ R	80 39		9.998191
To S. ♎ R	84 8		9.997718
From ∠ ♈ ☉ R	99 21		
∠ ♈ ☉ ♎	15 13	*Angle Orient.*	

Secondly, In the ſame Latitude of 67° 27′ North, let *Capricorn* 22° 17′ Aſcend; then what's the *Angle Orient*?



In the Oblique-angled Spherical Triangle ♍ ♈ ♎, the *Angle* R ♍ ♎ is Acute.

OPERATION.

	°	′	
As C.S. ∠ R ♍	23	29	10.362044
To Radius	90	00	10.000000
So C.S. ♍ ♈	67	43	9.578853
To C.S. ∠ R ♍ ♉	80	39	9.216809

Now, if the Perpendicular ♍ R be compared with the Angles at ♍ and ♈, and at ♌, they will be oppoſite Extreams

	°	′		
As C.S. ∠ R ♈ ♍	23	29	Co Ar.	0.037547
To C.S ∠ R ♌ ♍	22	23		9.965980
So S. ∠ R ♍ ♈ ſub.	80	39		9.994191
To S. ∠ R ♍ ♌ from	84	8		9.997718
Rem. ∠ ♈ ♍ ♌	3	29	=	*Angle Orient*

Which was to be proved, and was found in Page 184, by my new Method,

CHAP.

CHAP. XXI.

The Explanation and Uſe of the following Tables.

1. THE Tables of the Nonageſime Degree are made by the 34*th* Problem of my *Compleat Syſtem*; by which Tables the Nonageſime Degree may be found to any Time and Latitude, as mentioned on the Top, or Head of each Table; where I begin with a Right Sphere. And in that Table only, I have put the Right Aſcenſion of the Mid-Heaven anſwering every Degree of the Ecliptic; and to thoſe that do anſwer the Place of the Nonageſime Degree.

But in the other Tables I have omitted the Right Aſcenſion of the Mid-Heaven, it being needleſs to repeat it more than once in the Tables.

Therefore, when you have, (by Prob. 27, of my *Syſtem*) found the Right Aſcenſion of the Mid-Heaven, ſeek it in the Table of the Nonageſime Degree for the Latitude of No Degrees, and there are given both the Culminating Point, and the Place of the Nonageſime Degree anſwering in a Right Sphere.

Take this Culminating Point, or Cuſp of the tenth Houſe, and with it enter the Table of the Nonageſime Degree in the Latitude you intended, and there is the Place of the Nonageſime Degree for the Time and Latitude propos'd.

EXAMPLE.

Anno 1731, *July* 10, at 7 in the Evening, in the Latitude of 53 Degrees 22 Minutes North, I demand the Place of the Nonageſime Degree?

		°	′	″
Sun's Place then from my *Tables*	♋	28	20	14
Sun's Right Aſcenſion		120	27	0
Time from Noon		105	0	0
Sum, R. A. M. *Cœli*		225	27	0

Now,

Now, With the Right Aſcenſion of the Mid-Heaven 225 degr. 27 min. enter the firſt Table of the Nonageſime Degree, and there take out the Cuſp of the Tenth anſwering (ever minding to take the proportional Part for the odd Minutes) which I here find to be *Scorpio* 17 degr. 55 min.

With this I enter the Table for the Latitude 53 degr. 22 min. and there it gives me the Place of the Nonageſime Degree *Libra* 9° 31′.

Note, Theſe Tables are calculated for North Latitudes only; but they may be made Univerſal, by entring the Tables with the oppoſite Sign and Degree of the Cuſp of the Tenth, and there are given the oppoſite Sign, Degree and Minutes of the Place of the Nonageſime Degree.

Only obſerve, that when the very beginning of the two Tropical Signs Culminate, that then you muſt not enter the Tables with their Oppoſites, but with thoſe Signs themſelves, and the Degrees anſwering, is the Place of the Nonageſime Degree, as it is titled in the *Tables*.

EXAMPLE.

In the Latitude of 51 Degrees South, I deſire to know the Place of the Nonageſime Degree, when the beginning of every one of the 12 Signs Culminate?

Signs

Signs on the Meridian.

			°	′
♈	Then the Nonagesime Degree is	♓	3	46
♉		♓	25	51
♊		♈	27	57
♋		♋	0	0
♌		♍	2	3
♍		♎	4	9
♎		♎	26	14
♏		♏	16	12
♐		♐	7	13
♑		♑	0	0
♒		♑	22	47
♓		♒	13	48

Here you see when *Aries* Culminates, I enter the Table with *Libra*, and there is given ♍ 3° 46′; but I do not write *Virgo*, but its opposite Sign *Pisces*, and so of the rest, as in the Example above.

Note, The Altitude of the Nonagesime Degree is always equal to the Distance between the Zenith and the Pole of the Ecliptic.

To the Place of the Nonagesime Degree *Libra* 9° 31′ above found, add three Signs, and it makes *Capricorn* 9° 31′ for the Cusp of the Ascendant; with which, and the Latitude of the Place on the Head of the Table of the Angle Orient, is given the Altitude of the Nonagesime Degree.

EXAMPLE.

Let the Ascendant be *Capricorn* 9° 31′ (as above) and the Elevation of the Pole 53° 22′ North. I demand the Altitude of the Nonagesime Degree?

Find the Ascendant in the first Column on the Right Hand, and go streight towards the Left, till you come under the Latitude 53° on the Head, and in the Place of Meeting are given 25° 7′, the Altitude of the Nonagesime Degree.

But because the Tables are Calculated to even Degrees only, you must always mind to make proportion for the odd Minutes, both for the Latitude and Ascendant.

And

And ſo on the contrary; when the *Aſcendant* and *Altitude* of the Nonageſime Degree are given, the Latitude of the Place anſwering is given in the Tables, as I have fully exemplify'd in other places of this Book, where I treat of Solar Eclipſes.

Note, Theſe Tables are alſo calculated for North Latitudes. Therefore to uſe them in South Latitudes, you muſt enter the Side with the oppoſite Sign *Aſcending*; and in the Given Latitude is the Altitude of the *Nonageſime Degree*.

But when either the firſt Minute of *Cancer* or *Capricorn* Aſcends, it matters not whether you take the true Aſcendant, or its Oppoſite; for they will both give you the ſame true Altitude of the *Nonageſime Degree*; for in both Caſes, the Equinoctial Points are the Places of the *Nonageſime Degree*; conſequently, the Altitude of the *Nonageſime* is the ſame when the *Aſcendant* is either *Cancer* or *Capricorn*; becauſe the Equator is unalterable in the ſame Latitude.

So in the Latitude of 53° South and North, and the *Aſcendant Capricorn* or *Cancer*, the Altitude of the *Nonageſime Degree* is 29° 25'; and in the Latitude of 53 North, and *Aſcendant Gemini* 0°, the Altitude of the *Nonageſime Degree* is 19° 25'; but the ſame *Aſcendant Gemini* 0° and 53° South Latitude, the Altitude of the *Nonageſime Degree* is 43° 55'; becauſe then I enter the Table with the Oppoſite *Aſcendant*, viz *Sagittary* 0°.

For further ſatisfaction herein, I refer you to the Conſtruction of the Tables themſelves.

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3. The next is a correct Table of Refractions of the Sun, Moon and Stars, calculated by that great Mathematician Sir *Iſaac Newton*; (for the Laws of Refractions I refer you to my *Syſtem*, under that Word) He makes the Horizontal Refraction more by 45'' than Mr. *Flamſteed* doth; and the *French* Aſtronomers make it 1' leſs at *Paris*, than he did at *Greenwich*.

But as it falls out to be ſo little, that none but nice Inſtruments can perceive its Effects, it was not diſcover'd to be at all, till *Barnardo Walther*'s time, who was a Native of *Norimberg*, and flouriſh'd in the Year 1491, Diſciple to *Regiomonta-*

nus.

nus. See *Marcus Manilius*, *Fol.* 43. The Curve which a Beam of Light deſcribes, as it approaches the Earth, is one of the moſt perplex'd and intricate that can be propos'd.

As the Altitudes of the Stars, *&c.* are rais'd by the Refraction (as *per* Table) ſo their Diſtances from each other are contracted in whatſoever Poſition they are taken, *viz.* 1″ in every Degree of Diſtance when they are in the Horizon; ſo that the Diſtance, for Example, of 30° loſes but 30″ in an Horizontal Site

But if the one Star be 30, and the other 60 degr. high, the true Diſtance 30 degr. will appear to be only 29 degr. 59 min. But if one be 20 degr. high, and the other 50 degr. high, it will be leſſen'd by above three times as much, or by 1′ 41″, the Difference ſtill decreaſing, as the Objects are more Elevated above the Horizon. *Phil. Tranſ.* N°. 368

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4. The Fourth is a Table of the Moon's Parallax in Altitude, which by the Horizontal Parallax on the Head, and the Moon's Altitude in the firſt Column on the Left hand, and where they meet, is the Moon's Parallax in Altitude at that time, which always makes the Moon's true Altitude ſo much leſs, as is her Parallax.

This Table I calculated by *Prob* 38, of my *Syſtem*.

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5. The Fifth is a Table of the Moon's Parallax in Longitude and Latitude, which on the Head begins with 1′, and runs to 62′, being the Moon's Horizontal Parallax to ſerve for this purpoſe.

And the firſt Column on the Left hand, is in finding the Parallax in Longitude, the Diſtance of the Moon from the Nonageſime Degree. But in finding the Parallax in Latitude, the Numbers in the firſt Column are the Complement of the Altitude of the Nonageſime Degree.

The

The Table is thus made:

Admit the Moon's Horizontal Parallax be 56', and the Altitude of the Nonageſime Degree 30°, what Number in the Table muſt anſwer them?

OPERATION.

Moon's Horizontal Parallax	LL	° 56	LL	9.970040
Altit. of Nonageſime Degree	S.	30	Sine	9.698970
Anſwering in the Table		0 28	LL	9.669010

USE.

The Table of the Moon's Parallaxes is of excellent uſe in determining the Quantity of any Solar Eclipſe to any particular Place on the Earth, as I will ſhew anon.

1. For the Parallax in Longitude.

Enter the Table with the Moon's Horizontal Parallax on the Head, and the Altitude of the Nonageſime Degree in the firſt Column on the Left hand, and in the common Angle, or Place of meeting, is a Number which I call the *Horizontal Parallax in Longitude.*

Then with the Diſtance of the Moon from the *Nonageſime Degree* in the firſt Column on the Left hand, and the Horizontal Parallax of Longitude on the Head, gives the Parallax of the Moon in Longitude.

EXAM.

EXAMPLE.

Let the Horizontal Parallax of the Moon be 56′, the *Altitude* of the *Nonagesime Degree* 30°, and the Diſtance of the Moon from the *Nonagesime Degree* 72°: What's the Parallax of the Moon in Longitude?

	°	′	
Moon's Horizontal Parallax	0	56	Gives 28′.
Altitude Nonages. Degree	30	00	

Then,

	°	′	
Horiz. Parall. ☽ in Longitude	0	28	Gives 26′ 38″, the Parallax of the Moon in Longitude.
Diſt. ☽ from Nonag. Degree	72	0	

2. For the Parallax of the Moon in Latitude.

Enter the Table on the Head with the Horizontal Parallax of the Moon, and the firſt Column on the Left hand, with Complement of the *Altitude* of the *Nonagesime Degree*; and in the Place or meeting is the true Parallax of the Moon in Latitude.

EXAMPLE.

Admit the Horizontal Parallax of the Moon, and the *Altitude* of the *Nonagesime Degree* be as before: What's the Parallax of the Moon in *Altitude*?

	°	′	
Horizontal Parallax of the Moon	0	56	Parallax Latit.
Alt. Nonag. Degr. 72°, Complem.	18	0	17′ 18″.

Becauſe the Tables are calculated to even Minutes of Horizontal Parallax, and to even Degrees of the *Altitude* of the Nonagesime Degree, &c. when they contain Degrees, Minutes and Seconds, you muſt mind to make proportion for the Minutes and Seconds, as in the following

EXAM-

EXAMPLE.

	°	′	″
Let the Horizontal Parallax of the ☽ be	0	60	15
Altitude of the Nonageſime Degree	50	33	0
Diſtance of ☽ from the Nonageſime	34	1	0

What is the Parallax of the Moon in Longitude and Latitude?

OPERATION.

	°	′	″	
Moon's Horizontal Parallax	1	0	15	} Gives 46′ 31″
Altitude *Nonageſime Degree*	50	33	0	}

Then,

	°	′	″	
Horizontal Parallax ☽'s Longitude	0	46	31	} Gives 26′ 1″
Diſt. ☽ from *Nonageſime Degree*	34	1	0	} Par. Long.

Secondly,

	°	′	″	
Horizontal Parallax of the Moon	1	0	15	} Parall. Lat.
Alt. Nonage. 50° 33′ Complem.	39	27	0	} 38′ 17″

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6. Shewing how to examine the Quantity of any Solar Eclipſe in any Place on the Globe.

To the Time of the Viſible Conjunction, find the Moon's Horizontal Parallax and True Latitude; which note down.

Then to that Time, and the Given Latitude, find the Nonageſime Degree and its Altitude.

Take the Difference between the Place of the Moon, and the Place of the Nonageſime Degree, and with theſe find the Moon's Parallax in Latitude.

Apply

Apply this as the Caſe requires, to the true Latitude of the Moon, and by it you will plainly ſee the Quantity of the Sun's Eclipſe in that Latitude.

EXAMPLE.

Let it be required to find the Quantity of the Sun's Eclipſe that happen'd *Anno* 1733, *May* 2, in the Northern Parts of *Scotland*, which lies in the Latitude of 59 Degrees North?

OPERATION.

By a former Calculation of mine the time of the

	d.	h.	′	″
Viſible Conjunction at *London* is *May*	2	6	35	39
Difference of Meridians ſub.			20	0
Viſible ☌ near *Faro Head* in *Scotland*	2	6	15	39
Equation of Time ſub.			4	6
Sun's Place then from my Tables	♉	22	52	27
Sun's Right Aſcenſion		50	27	0
Time from Noon add		93	54	45
Sum, is the Right Aſcenſion *M. Cœli*		144	21	45
Cuſp of the Tenth	♌	21	59	0
Nonageſime Degr. in Lat. 59° North	♌	4	11	0
Sun's Place ſub.	♉	22	52	0
Diſt. of ☉ and ☽ from Nonageſime	2	11	19	0
Horizontal Parallax of the Moon		1	0	8
Aſcendant	♏	4	11	0
Altitude of the Nonageſime Degree		48	12	0
Complement		41	48	0
Parallax of Longitude of the Moon		0	42	27
Parallax of Latitude of the Moon		0	40	5
Moon's true Latitude N. D.		0	43	16
Viſible Latitude of the Moon N.D.			3	11
Sum of the Semidiameters of Sun and Moon			32	41
Parts deficient			29	30
Digits Eclipſed are on the upper ſide		11	1	0

Secondly, I would know how the ſame Eclipſe will appear at the Iſland of *Jamaica*?

OPERATION.

		d.	h.	′	″
Viſible Conjunction at *London*,	*May*	2	6	35	39
Difference of Meridians ſub.			5	4	0
Viſible Conjunction at *Jamaica*		2	1	31	39
Sun's true Place then from my Tables		♉	22	52	27
Sun's Right Aſcenſion			50	27	0
Apparent Time from Noon at *Jamaica* add			22	54	45
Right Aſcenſion *M. Cæli*			73	21	45
M. Cæli in the Ecliptic, Cuſp 10th		♊	14	41	0
Nonag. Degree in Latitude 18° North		♊	14	8	0
Sun's Place ſub. — —		♉	22	52	0
Diſt. of Luminaries from Nonag. Degree			21	16	0
Horizontal Parallax of the Moon			1	0	8
Aſcendant — —		♍	14	8	0
Altitude of the Nonageſime Degree			85	26	0
Complement — —			4	34	0
Parallax of Longitude of the Moon				21	44
Parallax of Latitude of the Moon				4	47
Moon's true Latitude N. D.				43	16
Viſible Latitude of the Moon				38	29
Sum of the Semid. of the Sun and Moon				32	41

Hence

Hence, becauſe the Viſible Latitude of the Moon at the time of the Viſible Conjunction of the Sun and Moon exceeds the Sum of their Semidiameters, proves, that there will not be any Eclipſe at all at the Place above-mentioned.

After the ſame manner may the Quantity of any other Solar Eclipſe be nearly determin'd at any Place on the Globe.

But here I muſt remind my Reader, that the times of the Viſible Conjunctions at theſe two Places are not truly found by ſubtracting the Difference of Meridians from the Time of the Viſible Conjunction at *London*, as is there done; becauſe the Parallaxes of the Moon in Longitude (on which the Viſible Conjunction depends) are not the ſame that they are at *London*. But however, this Method is ſufficient to try whether or no an Eclipſe of the Sun will be ſeen at ſuch a Place; and if Viſible, what part of the Sun's Body ſhall be obſcur'd, and (nearly) how much.

Alſo, if you reckon 184 Miles North and South, from the Parallel of *London*, you will nearly have one Digit to be added or ſubtracted to or from the Quantity of the Sun's Eclipſe at *London*, counting 69.5 Miles to one Degree on the Earth's Surface.

Theſe I propoſe as an Eſtimate, and not for perfect Truths; becauſe the Moon's Parallax in Latitude, on which the Quantity of the Sun's Eclipſe depends, is in a continual Flux; and therefore a particular Calculation to any Place is what only is perfect.

CHAP. XXIII.

An Abſtract *of an* Act of Parliament, *which Offers a Reward for the Diſcovery of the Longitude at Sea.*

1. Stat. 12. Annæ, Seſſ. 2. Chap. 15.

ENacted, That the Lord High Admiral of *England*, or the firſt Commiſſioner of the Admiralty, the Speaker of the Houſe of Commons, the firſt Commiſſioner of the Navy, the firſt Commiſſioner of Trade, the Admirals of the Red, White and Blue Squadrons, the Maſter of *Trinity-Houſe*, the Preſident of the Royal Society, the Royal Aſtronomer of *Greenwich*, the *Savilian*, and *Lucaſian* Profeſſors of the Mathematicks in *Oxford* and *Cambridge*, all for the time being; the Right Honourable *Thomas* Earl of *Pembroke* and *Montgomery*; *Philip*, Lord Biſhop of *Hereford*; *George* Lord Biſhop of *Briſtol*; *Thomas* Lord *Trevor*; Sir. *Thomas Hanmer*, Baronet, Speaker, &c. *Francis Roberts*, *James Stanhope*, *William Clayton* and *William Lowndes*, Eſqrs. ſhall be Commiſſioners for diſcovering the Longitude at Sea, and for examining all Propoſals relating to it; and that any five of them may receive Propoſals for that purpoſe, and if they be ſatisfied of the probability of ſuch Diſcovery, they ſhall certifie it to the Commiſſioners of the Navy, with the Author's Name; and on producing ſuch Certificate, the Commiſſioners of the Navy ſhall make Bills for any Sum not exceeding 2000 *l.* as they ſhall think fit, for making the Experiment, payable by the Treaſurer of the Navy, who ſhall pay it immediately out of any Money unapply'd, for the uſe of the Navy.

2. After

2. After the Experiment is made, the Commiſſioners appointed by this Act ſhall determine how far, and to what Degree of Exactneſs 'tis practicable.

3. The firſt Diſcoverer of a Method for finding the Longitude ſhall be entituled to a Reward of 10000 *l.* if it determines the ſame to one Degree of a great Circle, or 60 Geographical Miles; and to 15000 *l.* if it determines the ſame to two thirds of that diſtance; and to 20000 *l.* if it determines the ſame to one half of that Diſtance; and one half of ſuch Reward ſhall be paid when the Major part of the Commiſſioners agree, that ſuch Method extends to the Security of Ships within 80 Geographical Miles of the Shore, which are Places of the greateſt Danger; and the other half, when a Ship, by the appointment of the Commiſſioners, ſhall Sail over the Ocean from *Great Britain* to any part in the *Weſt-Indies* which they ſhall nominate for the Experiment, without loſing their Longitude beyond the Limits mentioned.

As ſoon as ſuch Methods ſhall be tried and found practicable at Sea, within any the Degrees aforeſaid, the Commiſſioners ſhall Certifie the ſame to the Commiſſioners of the Navy, with the Author's Name, and on ſuch Certificate the Commiſſioners ſhall make out a Bill for the reſpective Sums to which the Author ſhall be entituled, and to be paid by the Treaſurer of the Navy.

This *Act* has encouraged many to bend their Thoughts towards the Diſcovery of the Longitnde at Sea.

The Names of ſuch as are come to hand, with the Times when they publiſh'd their Notions, I rank in their Order, thus:

MR. *Henry Bond*, 1676, By the Magnetical Needle.
Mr. Ed. Harriſon, 1696, Of the ſeveral Methods propos'd.
The Rev. *Mr. Geo. Keith*, 1709, By the Fixed Stars, *Scheder.*
Mr. Francis Cawood, 1712, By Inſtruments, called *Acute Aſtronomer.*
Meſſrs. Whiſton and *Ditton*, 1714, By Exploſion.
Mr. John Ward, 1714, By an Automaton.
Mr. William Hall, 1714, By a Watch and the Sun at Riſing.
Mr. Rob. Brown, 1714, By Celeſtial Obſervations, and Watches.
Mr. Steph. Plank, 1720, By the Moon ſeparating from the Fixed Stars.
Mr. Tho. Holder, 1723, By a Nonſenſical Inſtrument.
Mr. Geo. Gorden, 1724, By obſerving the Eclipſes of *Jupiter's* Satellites.
Capt. *Jacob Rowe*, 1725, By an Horometer.
Mr. Jackſon, 1726, By a monſtrous Machine.
The Sailor's Propoſal, 1726, By ☽'s Viſible Declination.
Mr. Rob. Wright, 1728, By ☽'s Place, *&c.*
Mr. R. Lock, 1730, By the Moon receding from the Sun.
Mr. John Bates, 1730, By Chimæra's in his Brain.
Mr. Whiſton, 1731, By the Dipping Needle.
Mr. Eli. Pledger, 1731, By a fluid Quadrant. Latitude.
Mr. Benj Parker, 1731, By the Moon's Southing.
Mr. John Gueſt, 1731, By an Armillary Sphere.
Mr. Rob. Wright, 1732, By the Moon's Place.

A Table *of the Digits and Decimal Parts of the Moon's Light, to every Hour of the first Day after her Change, and from thence to every Day of her Age.*

☽'s Age H.	Digits light.	Moon's Age Days d.	h.	Digits light.	Moon's Age Days. d.	h.	Digits light.
1	.0338983	0	0	— — — —	29	12	— — — —
2	.0677966	1		0.8135592	29		0.4367814
3	.1016949	2		1.6271184	28		1.2203406
4	.1355932	3		2.4406776	27		2.0338998
5	.1694915	4		3.2542368	26		2.8474590
6	.2033898	5		4.0677960	25		3.6610882
7	.2372881	6		4.8813552	24		4.4745774
8	.2711864	7		5.6949144	23		5.2881366
9	.3050847	8		6.5014736	22		6.1016958
10	.3389830	9		7.3220328	21		6.9152550
11	.3728813	10		8.1355920	20		7.7288142
12	.4067796	11		8.9491512	19		8.5123734
13	.4406779	12		9.7627104	18		9.3559328
14	.4745762	13		10.5762696	17		10.1694918
15	.5084745	14		11.3898288	16		10.9830510
16	.5423728						
17	.5762711	14	18	12. — — —	15		11.7966102
18	.6101694						
19	.6440677						
20	.6779660						
21	.7118643						
22	.7457626						
23	.7796609						
24	.8135592						

A Table of the Time that the two Pointers in the Great Bear will be upon the Meridian above the Pole.

Days	January h.	'	February. h.	'	March. h.	'
1	3 M	9	1 M	0	11 A.	15
2	3	5	12 A	56	11	12
3	3	1	12	53	11	8
4	2	56	12	49	11	5
5	2	52	12	46	11	1
6	2	48	12	42	10	57
7	2	44	12	38	10	54
8	2	39	12	34	10	50
9	2	34	12	30	10	46
10	2	30	12	27	10	43
11	2	26	12	23	10	39
12	2	21	12	19	10	36
13	2	17	12	15	10	32
14	2	13	12	11	10	28
15	2	9	12	8	10	25
16	2	5	12	4	10	21
17	2	1	12	0	10	17
18	1	57	11	56	10	14
19	1	53	11	53	10	10
20	1	49	11	49	10	7
21	1	45	11	45	10	3
22	1	41	11	41	9	59
23	1	37	11	38	9	56
24	1	33	11	34	9	52
25	1	28	11	30	9	48
26	1	24	11	27	9	45
25	1	20	11	23	9	41
28	1	16	11	19	9	37
29	1	12			9	34
30	1	8			9	30
31	1	4			9	26

The Table of the time when the two Pointers in the Great Bear will be upon the Meridian above the Pole, continued.

Days	April. h. ′	May. h. ′	June. h. ′
1	9 A. 25	7 A. 31	5 A. 26
2	9 21	7 27	5 22
3	9 17	7 23	5 18
4	9 14	7 20	5 13
5	9 10	7 16	5 9
6	9 6	7 12	5 5
7	9 3	7 8	5 1
8	8 59	7 4	4 57
9	8 55	7 0	4 53
10	8 51	6 56	4 49
11	8 48	6 52	4 44
12	8 44	6 48	4 40
13	8 40	6 44	4 36
14	8 36	6 40	4 32
15	8 33	6 36	4 28
16	8 29	6 32	4 24
17	8 25	6 28	4 19
18	8 21	6 23	4 15
19	8 18	6 19	4 11
20	8 14	6 15	4 7
21	8 10	6 11	4 3
22	8 6	6 7	3 59
23	8 2	6 3	3 55
24	7 58	5 59	3 51
25	7 55	5 55	3 46
26	7 51	5 51	3 42
27	7 47	5 47	3 38
28	7 43	5 42	3 34
29	7 39	5 38	3 30
30	7 35	5 34	3 26
31		5 30	

☞ In Page 312, the Time is 2′ too little.

The Table *of the time when the two Pointers in the Great Bear will be upon the Meridian above the Pole, continued.*

Days	July. h. ′	Auguſt. h. ′	Sept. h. ′	Oct. h. ′	Nov. h. ′	Dec. h. ′
1	3 A. 22	1 A. 20	11 M. 26	9 M. 38	7 M. 37	5 M. 29
2	3 18	1 16	11 23	9 34	7 33	5 25
3	3 14	1 12	11 19	9 30	7 29	5 20
4	3 10	1 9	11 15	9 26	7 25	5 16
5	3 6	1 5	11 12	9 23	7 21	5 12
6	3 2	1 1	11 8	9 19	7 17	5 7
7	2 58	0 57	11 5	9 15	7 13	5 3
8	2 54	0 54	11 1	9 11	7 9	4 58
9	2 50	0 50	10 57	9 8	7 4	4 54
10	2 46	0 46	10 54	9 4	7 0	4 49
11	2 42	0 42	10 50	9 0	6 56	4 45
12	2 39	0 39	10 47	8 56	6 52	4 41
13	2 35	0 35	10 43	8 52	6 47	4 36
14	2 31	0 32	10 39	8 49	6 43	4 32
15	2 27	0 28	10 36	8 45	6 39	4 27
16	2 22	0 24	10 32	8 41	6 35	4 23
17	2 18	0 21	10 29	8 37	6 30	4 18
18	2 14	0 17	10 25	8 33	6 26	4 14
19	2 10	0 13	10 21	8 29	6 22	4 09
20	2 6	0 10	10 18	8 25	6 17	4 5
21	2 2	0 6	10 14	8 21	6 13	4 1
22	1 58	0 2	10 11	8 17	6 9	3 56
23	1 54	11 M. 59	10 7	8 14	6 4	3 52
24	1 51	11 55	10 5	8 10	6 0	3 47
25	1 47	11 51	10 0	8 6	5 56	3 43
26	1 43	11 48	9 56	8 2	5 51	3 39
27	1 39	11 44	9 52	7 58	5 47	3 34
28	1 35	11 41	9 49	7 54	5 43	3 30
29	1 31	11 37	9 45	7 50	5 38	3 25
30	1 28	11 33	9 41	7 46	5 34	3 21
31	1 24	11 30		7 41		3 17

The

A Table *of the time when the First Pointer in the Little Bear comes to the Meridian above the Pole.*

Days	Jan. h. ′	Febr. h. ′	Mar. h. ′	April h. ′	May h. ′	June. h. ′
1	7 M 14	5 M 6	3 M 20	1 M 28	11 M 34	9 A 29
2	7 10	5 2	3 17	1 24	11 30	9 25
3	7 6	4 59	3 13	1 20	11 26	9 21
4	7 1	4 55	3 10	1 17	11 23	9 16
5	6 57	4 51	3 6	1 13	11 19	9 12
6	6 53	4 47	3 1	1 9	11 15	9 8
7	6 49	4 43	2 59	1 6	11 11	9 4
8	6 44	4 39	2 55	1 2	11 7	9 0
9	6 40	4 35	2 51	12 A 58	11 3	8 56
10	6 36	4 32	2 48	12 54	10 59	8 52
11	6 32	4 21	2 44	12 51	10 55	8 47
12	6 28	4 24	2 41	12 47	10 51	8 43
13	6 23	4 20	2 37	12 43	10 47	8 39
14	6 19	4 16	2 33	12 39	10 43	8 35
15	6 1	4 13	2 30	12 36	10 39	8 31
16	6 11	4 9	2 26	12 32	10 35	8 27
17	6 7	4 5	2 22	12 28	10 31	8 22
18	6 3	4 1	2 19	12 24	10 26	8 18
19	5 58	3 58	2 15	12 21	10 22	8 14
20	5 54	3 54	2 12	12 17	10 18	8 10
21	5 50	3 50	2 8	12 13	10 14	8 6
22	5 46	3 46	2 4	12 9	10 10	8 2
23	5 42	3 43	2 1	12 5	10 6	7 58
24	5 38	3 39	1 57	12 1	10 2	7 54
25	5 34	3 35	1 53	11 58	9 58	7 49
26	5 30	3 32	1 50	11 54	9 54	7 45
27	5 26	3 28	1 46	11 50	9 50	7 41
28	5 22	3 24	1 42	11 46	9 45	7 37
29	5 18	——	1 39	11 42	9 41	7 33
30	5 14	——	1 35	11 38	9 37	7 29
31	5 10	——	1 31	——	9 33	——

The

The Table *of the time when the First Pointer in the Little Bear comes to the South.*

Day	July. h.	'	August. h.	'	Sept. h.	'	Octob. h.	'	Novem. h.	'	Decemb. h.	'
1	7	A.25	5	A.23	3	A.29	1	A. 41	11	M.40	9	M. 32
2	7	21	5	19	3	26	1	37	11	36	9	28
3	7	17	5	15	3	22	1	33	11	32	9	23
4	7	13	5	12	3	18	1	29	11	28	9	19
5	7	9	5	8	3	15	1	26	11	24	9	15
6	7	5	5	4	3	11	1	22	11	20	9	10
7	7	1	5	0	3	8	1	18	11	16	9	6
8	6	57	4	57	3	4	1	14	11	12	9	1
9	6	53	4	53	3	0	1	11	11	7	8	57
10	6	49	4	49	2	57	1	7	11	3	8	52
11	6	45	4	46	2	53	1	3	10	59	8	48
12	6	41	4	42	2	50	0	59	10	55	8	44
13	6	37	4	38	2	49	0	55	10	50	8	39
14	6	33	4	35	2	42	0	52	10	46	8	35
15	6	29	4	31	2	39	0	48	10	42	8	30
16	6	25	4	27	2	35	0	44	10	38	8	26
17	6	21	4	24	2	32	0	40	10	33	8	21
18	6	17	4	20	2	28	0	36	10	29	8	17
19	6	13	4	16	2	24	0	32	10	25	8	12
20	6	9	4	13	2	21	0	28	10	20	8	8
21	6	5	4	9	2	17	0	24	10	16	8	4
22	6	1	4	5	2	14	0	21	10	12	7	59
23	5	57	4	2	2	10	0	17	10	7	7	55
24	5	54	3	58	2	6	0	13	10	3	7	50
25	5	50	3	54	2	3	0	9	9	59	7	46
26	5	46	3	51	1	59	0	5	9	54	7	42
27	5	42	3	47	1	55	0	1	9	50	7	37
28	5	38	3	44	1	52	11	M57	9	46	7	33
29	5	34	3	40	1	48	11	53	9	41	7	28
30	5	31	3	36	1	44	11	49	9	37	7	24
31	5	27	3	33			11	44			7	20

A

TABLE

OF THE

Nonageſime Degree,

To the Obliquity of the Ecliptic 23 Degrees, 29 Minutes, from the Equator to 60 Degrees of North and South Latitude.

A Table *of the Nonageſime Degree, to the Obliquity of the Ecliptic* 23° 29′ *and Latitude* 0°.

Cuſp 10. *Aries.*	R. Aſcen. *M. Cæli.*		Nonage-ſime.	
	°	′	°	′
0	0	0	0 ♈	0
1	0	55	0	51
2	1	50	1	42
3	2	45	2	32
4	3	40	3	22
5	4	35	4	12
6	5	30	5	3
7	6	26	5	54
8	7	21	6	44
9	8	16	7	35
10	9	11	8	26
11	10	6½	9	17
12	11	2	10	8
13	11	57	10	59
14	12	53	11	50
15	13	48	12	42
16	14	44	13	33
17	15	40	14	25
18	16	36	15	16
19	17	32	16	8
20	18	28	17	1
21	19	24	17	53
22	20	20	18	46
23	21	16	19	38
24	22	13	20	31
25	23	9	21	14
26	24	6	22	17
27	25	3	23	11
28	26	0	24	5
29	26	57	24	59
30	27	54	25	54

The Table *of the Nonageſime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cuſp 10. *Taurus.*	R. Aſcen. *M. Cæli.*		Nonage-ſime.	
°	°	′	°	′
0	27	54	25 ♈	54
1	28	52	26	48
2	29	49	27	43
3	30	47	28	38
4	31	45	29	34
5	32	43	0 ♉	29
6	33	41	1	25
7	34	39	2	21
8	35	37	3	18
9	36	36	4	15
10	37	35	5	12
11	38	34	6	10
12	39	33	7	8
13	40	32	8	6
14	41	32	9	4
15	42	32	10	3
16	43	31	11	2
17	44	31	12	2
18	45	32	13	2
19	46	32	14	2
20	47	33	15	3
21	48	33	16	4
22	49	34	17	5
23	50	36	18	7
24	51	37	19	10
25	52	38	20	14
26	53	40	21	16
27	54	42	22	19
28	55	44	23	23
29	56	46	24	27
30	57	49	25	31

The Table *of the Nonageſime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0°, *continu'd.*

Cuſp 10. Gemini. ° ′	R. Aſcen. M. Cœli. ° ′	Nonageſime. ° ′
0	57 49	25 ♉ 31
1	58 51	26 35
2	59 54	26 40
3	60 57	28 46
4	62 0	29 52
5	63 3	0 ♊ 59
6	64 6	2 9
7	65 10	3 13
8	66 14	4 20
9	67 17	5 28
10	68 21	6 35
11	69 25	7 43
12	70 30	8 52
13	71 34	10 1
14	72 38	11 11
15	73 43	12 20
16	74 48	13 29
17	75 52	14 39
18	76 57	15 49
19	78 2	16 59
20	79 7	18 9
21	80 12	19 20
22	81 17	20 31
23	82 22	21 42
24	83 28	22 52
25	84 33	24 3
26	85 38	25 14
27	86 44	26 26
28	87 49	27 37
29	88 55	28 49
30	90 0	0 ♋ 0

The Table of the Nonageſime Degree, to the Obliquity of the Ecliptic 23° 29', and Latitude 0°, continu'd.

Cuſp 10. Cancer.	R. Aſcen. M. Cœli.		Nonage-ſime.	
♋	°	′	°	′
0	90	0	0 ♑	0
1	92	5	1	11
2	92	11	2	23
3	93	16	3	34
4	94	22	4	46
5	95	27	5	57
6	96	32	7	8
7	97	38	8	18
8	98	43	9	29
9	99	48	10	40
10	100	53	11	51
11	101	58	13	1
12	103	3	14	11
13	104	8	15	21
14	105	12	16	31
15	106	17	17	40
16	107	22	18	49
17	108	26	19	59
18	109	30	21	8
19	110	35	22	17
20	111	39	23	25
21	112	43	24	33
22	113	46	25	40
23	114	50	26	47
24	115	54	27	54
25	116	57	29	1
26	118	0	0 ♌	3
27	119	3	1	13
28	120	6	2	19
29	121	9	3	24
30	122	11	4	29

The Table of the Nonageſime Degree, to the Obliquity of the Ecliptic 23° 39', and 0° Latitude.

Cuſp 10. *Leo.* °	R. Aſcen. *M. Cœli* °	′	Nonageſime. °	′
0	122	11	4 ♌	29
1	123	14	5	33
2	124	16	6	37
3	125	18	7	41
4	126	20	8	44
5	127	22	9	47
6	128	23	10	50
7	129	24	11	53
8	130	26	12	55
9	131	26	13	56
10	132	27	14	57
11	133	28	15	58
12	134	28	16	58
13	135	29	17	58
14	136	29	18	58
15	137	28	19	57
16	138	28	20	56
17	139	28	21	54
18	140	27	22	52
19	141	26	23	50
20	142	25	24	48
21	143	24	25	45
22	144	23	26	42
23	145	21	27	39
24	146	19	28	35
25	147	17	29	31
26	148	15	0 ♍	26
27	149	13	1	22
28	150	11	2	17
29	151	8	3	12
30	152	6	4	6

A Table *of the* Nonagesime *Degrees, to the Obliquity of the Ecliptic* 23° 29', *and Latitude* 0°, *continu'd.*

Cuſp 10. *Virgo.* °	R. Aſcen. *M. Celi.* °	'	Nonage-ſime. °	'
0	152	6	4	6
1	153	3	5	1
2	154	0	5	55
3	154	57	6	49
4	155	54	7	42
5	156	51	8	36
6	157	47	9	29
7	158	44	10	22
8	159	40	11	14
9	160	36	12	7
10	161	32	12	59
11	162	28	13	52
12	163	24	14	44
13	164	20	15	35
14	165	16	16	27
15	166	12	17	18
16	167	7	18	10
17	168	3	19	1
18	168	58	19	52
19	169	53½	20	43
20	170	49	21	34
21	171	44	22	25
22	172	39	23	16
23	173	34	24	7
24	174	30	24	57
25	175	25	25	48
26	176	20	26	38
27	177	15	27	28
28	178	10	28	18
29	179	5	29	9
30	180	0	0	0

The Table *of the Nonageſime Degree, to the Obliquity of the Ecliptic* 23° 29′, *and Latitude* 0, *continued.*

Cuſp 10. *Libra.*	R. Aſcen. M. Cæli.		Nonageſime.	
○	D	′	♑	♓
0	180	0	0	0
1	180	55	0	51
2	181	50	1	42
3	182	45	2	32
4	183	40	3	22
5	184	35	4	13
6	185	30	5	3
7	186	26	5	54
8	187	21	6	44
9	188	16	7	35
10	189	11	8	26
11	190	6½	9	17
12	191	2	10	8
13	191	57	10	59
14	192	51	11	50
15	193	48	12	42
16	194	44	13	53
17	195	40	14	25
18	196	36	15	16
19	197	32	16	8
20	198	28	17	1
21	199	24	17	53
22	200	20	18	46
23	201	16	19	38
24	202	13	20	31
25	203	9	21	24
26	204	6	22	17
27	205	3	23	11
28	206	0	24	5
29	207	57	24	59
30	208	54	25	54

A Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29′. *and Latitude* 0°, *continued.*

Cusp 10. Scorpio.	R. Ascen. M. Cœli.		Nonagesime.	
♏	°	′	°	′
0	207	54	♋ 25	54
1	208	52	26	48
2	209	49	27	43
3	210	47	28	38
4	211	45	29	34
5	212	43	♌ 0	29
6	213	41	1	25
7	214	39	2	21
8	215	37	3	18
9	216	36	4	15
10	217	35	5	12
11	218	34	6	10
12	219	33	7	8
13	220	32	8	6
14	221	32	9	4
15	222	32	10	3
16	223	31	11	2
17	224	31	12	2
18	225	32	13	2
19	226	32	14	2
20	227	33	15	3
21	228	33⅓	16	4
22	229	34	17	5
23	230	36	18	7
24	231	37	19	10
25	232	38	20	13
26	233	40	21	16
27	234	42	22	19
28	235	44	23	23
29	236	46	24	27
30	237	49	25	31

The Table *of the Nonagesime Degree, to the Obliquity of the Ecliptic* 23° 29, *and Latitude* 0°, *continu'd.*

Cuſp 10. *Sagittary* °	R. Aſcen. *M. Cœli.* °	′	Nonage-ſime. °	
0	237	49	25 ♏	31
1	238	51	26	35
2	239	54	27	40
3	240	57	28	46
4	242	0	29	52
5	243	3	0 ♐	59
6	244	6	2	6
7	245	10	3	13
8	246	14	4	20
9	247	17	5	28
10	248	21	6	35
11	249	25	7	43
12	250	30	8	52
13	251	34	10	1
14	252	38	11	11
15	253	43	12	20
16	254	48	13	29
17	255	52	14	39
18	256	57	15	49
19	258	2	16	59
20	259	7	18	9
21	260	12	19	20
22	261	17	20	31
23	262	22½	21	42
24	263	28	22	52
25	264	33	24	3
26	265	38	25	14
27	266	44	26	26
28	267	49	27	37
29	268	55	28	49
30	270	0	0 ♑	0

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The Table *of the Nonageſime Degree, to the Obliquity of the Ecliptic* 23° 29, *and Latitude* 0°, *continu'd.*

Cuſp 10. *Capricorn.* °	R. Aſcen. *M. Cæli.* ° ′	Nonage-ſime. ° ′
0	270 0	0 ♑ 0
1	271 5	1 11
2	272 11	2 23
3	273 16	3 34
4	274 22	4 46
5	275 27	5 57
6	276 32	7 8
7	277 38	8 18
8	278 43	9 29
9	279 48	10 40
10	280 53	11 51
11	281 58	13 1
12	283 3	14 11
13	284 8	15 21
14	285 12	16 31
15	286 17	17 40
16	287 22	18 49
17	288 26	19 59
18	289 30	21 8
19	290 35	22 17
20	291 39	23 25
21	292 43	24 33
22	293 46	25 40
23	294 50	26 47
24	295 54	27 54
25	296 57	29 1
26	298 0	0 ♒ 7
27	299 3	1 13
28	300 6	2 19
29	301 9	3 24
30	302 11	4 29

The Table *of the Nonageſime Degee, to the Obliquity of the Ecliptic, 23° 29′, and Latitude 0°.*

Cuſp 10. *Aquarius* °	R. Aſcen. M. Cœli. °	′	Nonageſime. °		′
0	302	11	4	♒	29
1	303	14	5		33
2	304	16	6		37
3	305	18	7		41
4	306	20	8		44
5	307	22	9		47
6	308	23	10		50
7	309	24	11		53
8	310	26	12		55
9	311	26½	13		56
10	312	27	14		57
11	313	28	15		58
12	314	28	16		58
13	315	29	17		58
14	316	29	18		58
15	317	28	19		57
16	318	28	20		56
17	319	28	21		54
18	320	27	22		52
19	321	26	23		50
20	322	25	24		48
21	323	24	25		45
22	324	23	26		42
23	325	21	27		39
24	326	19	28		35
25	327	17	29		31
26	328	15	0	♓	26
27	329	13	1		22
28	330	11	2		17
29	331	8	3		12
30	332	6	4		6

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The Table of the Nonageſime Degree, to the Obliquity of the Ecliptic 23° 29, and Latitude 0°, continued.

Cuſp 10. Piſces. °	R. Aſcen. M. Cœli. ° ′	Nonageſime. ° ′
0	332 6	4 ♑ 6
1	333 3	5 1
2	334 0	5 55
3	334 57	6 49
4	335 54	7 43
5	336 51	8 36
6	337 47	9 29
7	338 44	10 22
8	339 40	11 14
9	340 36	12 7
10	341 32	12 59
11	342 28	13 52
12	343 24	14 44
13	344 20	15 35
14	345 16	16 27
15	346 12	17 19
16	347 7	18 10
17	348 3	19 1
18	348 58	19 52
19	349 53½	20 43
20	350 49	21 34
21	351 44	22 25
22	352 39	23 16
23	353 34	24 6
24	354 30	24 57
25	355 25	25 47
26	356 20	26 37
27	357 15	27 28
28	358 10	28 18
29	359 5	29 9
30	360 0	♂ ♂

A Table of the Nonageſime Degree, to the Latitude of 4 Degrees.

Cuſp 10. *Aries.* °	Nonageſime. °	′	Cuſp 10 *Taurus.* °	Nonageſime. °	′
0	1 ♈	36	0	27 ♈	21
1	2	28	1	28	14
2	3	18	2	29	8
3	4	13	3	0 ♉	2
4	4	58	4	0	57
5	5	48	5	1	52
6	6	39	6	2	47
7	7	30	7	3	43
8	8	20	8	4	38
9	9	10	9	5	34
10	10	1	10	6	31
11	10	52	11	7	28
12	11	42	12	8	24
13	12	33	13	9	22
14	13	24	14	10	20
15	14	16	15	11	18
16	15	7	16	12	16
17	15	58	17	13	15
18	16	49	18	14	13
19	17	40	19	15	12
20	18	33	20	16	12
21	19	25	21	17	12
22	20	16	22	18	12
23	21	7	23	19	12
24	22	0	24	20	14
25	22	53	25	21	15
26	23	45	26	22	17
27	24	39	27	23	19
28	25	32	28	24	21
29	26	26	29	25	25
30	27	20	30	26	26

The Table *of the Nonageſime Degree, for the Latitude of 4 Degrees, continu'd.*

Cuſp 10. *Gemini.* °	Nonageſime. °	′	Cuſp 10. *Cancer.* °	Nonageſime. °	′
0	26 ♉	26	0	0 ♋	0
1	27	29	1	1	9
2	28	33	2	2	19
3	29	37	3	3	28
4	0 ♊	42	4	4	38
5	1	47	5	5	47
6	2	52	6	6	56
7	3	58	7	8	4
8	5	3	8	9	13
9	6	9	9	10	22
10	7	15	10	11	31
11	8	21	11	12	39
12	9	28	12	13	47
13	10	35	13	14	55
14	11	42	14	16	3
15	12	49	15	17	11
16	13	56	16	18	18
17	15	5	17	19	26
18	16	13	18	20	33
19	17	21	19	21	40
20	18	29	20	22	46
21	19	38	21	23	51
22	20	47	22	24	58
23	21	56	23	26	3
24	23	5	24	27	9
25	24	14	25	28	14
26	25	23	26	29	18
27	26	31	27	0 ♌	24
28	27	42	28	1	27
29	28	51	29	2	30
30	0 ♋	0	30	3	34

The Table *of the Nonageſime Degree, for the Latitude of 4 Degrees, continued.*

Cuſp 10. *Leo.* °	Nonageſime. ° '	Cuſp 10. *Virgo.* °	Nonageſime. ° '
0	3 ♌ 34	0	2 ♍ 40
1	4 37	1	3 35
2	5 40	2	4 28
3	6 42	3	5 21
4	7 44	4	6 14
5	8 45	5	7 7
6	9 47	6	8 0
7	10 48	7	8 52
8	11 49	8	9 44
9	12 49	9	10 36
10	13 48	10	11 28
11	14 48	11	12 20
12	15 47	12	13 12
13	16 46	13	14 3
14	17 44	14	14 54
15	18 43	15	15 45
16	19 41	16	16 36
17	20 39	17	17 27
18	21 36	18	18 18
19	22 33	19	19 9
20	23 30	20	19 59
21	24 26	21	20 50
22	25 22	22	21 41
23	26 18	23	22 31
24	27 14	24	23 21
25	28 9	25	24 12
26	29 3	26	25 2
27	29 58	27	25 52
28	0 ♍ 53	28	26 42
29	1 47	29	27 33
30	2 40	30	28 23

A Table of the Nonageſime Degree, for the Latitude of 4 Degrees.

Cuſp 10. *Libra.* °	Nonageſime. ° '	Cuſp 10. *Scorpio.* °	Nonageſime. ° '
0	28 ♈ 23	0	24 ♎ 23
1	29 14	1	25 18
2	0 ♉ 4	2	26 14
3	0 55	3	27 9
4	1 45	4	28 6
5	2 36	5	29 2
6	3 27	6	29 58
7	4 17	7	0 ♐ 55
8	5 8	8	1 52
9	5 59	9	2 50
10	6 50	10	3 48
11	7 41	11	4 46
12	8 32	12	5 44
13	9 23	13	6 44
14	10 14	14	7 43
15	11 6	15	8 43
16	11 56	16	9 43
17	12 50	17	10 44
18	13 42	18	11 45
19	14 34	19	12 46
20	15 27	20	13 49
21	16 19	21	14 51
22	17 12	22	15 55
23	18 5	23	16 58
24	18 58	24	18 1
25	19 52	25	19 5
26	20 45	26	20 9
27	21 39	27	21 14
28	22 34	28	22 19
29	23 28	29	23 25
30	24 23	30	24 31

The

The Table *of the Nonageſime Degree for the Latitude of 4 Degrees, continued.*

Cuſp 10. *Sagittary* °	Nonageſime. ° ′	Cuſp 10. *Capricorn* ° ′	Nonageſime. ° °
0	24 ♏ 31	0	0 ♍ 0
1	25 36	1	1 13
2	26 42	2	2 27
3	27 50	3	3 41
4	28 57	4	4 35
5	29 ♐ 6	5	6 9
6	1 14	6	7 21
7	2 20	7	8 35
8	3 32	8	9 48
9	4 42	9	11 1
10	5 51	10	12 14
11	7 1	11	13 27
12	9 11	12	14 39
13	10 23	13	15 51
14	11 34	14	17 2
15	12 45	15	18 4
16	13 57	16	19 26
17	14 9	17	20 38
18	15 22	18	21 49
19	16 34	19	23 0
20	17 46	20	24 9
21	19 59	21	25 19
22	20 12	22	26 26
23	21 25	23	27 37
24	22 38	24	28 46
25	23 52	25	29 54
26	25 5	26	1 ♒ 2
27	26 19	27	2 10
28	27 33	28	3 18
29	28 47	29	4 24
30	0 ♎ 0	30	5 32

The

The Table *of the Nonageſime Degree for the Latitude of 4 Degrees, continued.*

Cuſp 10. *Aquarius* °	Nonageſime, ° ′	Cuſp 10. *Piſces.* °	Nonageſime. °
0	5 ♒32	0	5 ♓37
1	6 36	1	6 32
2	7 42	2	7 27
3	8 47	3	8 21
4	9 51	4	9 15
5	10 55	5	10 08
6	12 0	6	11 2
7	13 4	7	11 56
8	14 7	8	12 48
9	15 9	9	13 41
10	16 11	10	14 33
11	17 13	11	15 27
12	18 14	12	16 19
13	19 16	13	17 10
14	20 17	14	18 3
15	21 17	15	18 55
16	22 17	16	19 46
17	23 16	17	20 38
18	24 15	18	21 29
19	25 14	19	22 21
20	26 12	20	23 11
21	27 10	21	24 2
22	28 8	22	24 53
23	29 6	23	25 43
24	0 ♓ 3	24	26 34
25	0 59	25	27 24
26	1 56	26	28 15
27	2 52	27	29 5
28	3 47	28	29 56
29	4 42	29	0 ♈46
30	5 37	30	1 36

A Table of the Nonagesime Degree, for the Latitude of 6 Degrees.

Cusp 10. *Aries.* ° ′	Nonagesime. ° ′	Cusp 10. *Taurus.* °	Nonagesime. ° ′
0	3 ♈ 11	0	28 ♈ 46
1	4 4	1	29 39
2	4 54	2	0 ♉ 33
3	5 44	3	1 26
4	6 35	4	2 20
5	7 25	5	3 14
6	8 15	6	4 8
7	9 5	7	5 3
8	9 55	8	5 58
9	10 45	9	6 53
10	11 36	10	7 49
11	12 26	11	8 45
12	13 16	12	9 41
13	14 7	13	10 38
14	14 58	14	11 35
15	15 49	15	12 32
16	16 40	16	13 30
17	17 30	17	14 27
18	18 21	18	15 24
19	19 12	19	16 22
20	20 4	20	17 20
21	20 55	21	18 19
22	21 46	22	19 18
23	22 37	23	20 17
24	23 29	24	21 17
25	24 22	25	22 17
26	25 14	26	23 17
27	26 7	27	24 17
28	26 59	28	25 18
29	27 52	29	26 19
30	28 46	30	27 20

The Table *of the Nonageſime Degree, for the Latitude of 8 Degrees, continu'd.*

Cuſp 10. *Gemini.*	Nonageſime.		Cuſp 10. *Cancer.*	Nonageſime.	
0	27 ♉	21	0	0 ♋	0
1	28	23	1	1	8
2	29	25	2	2	15
3	0 ♊	28	3	3	21
4	1	31	4	4	29
5	2	35	5	5	36
6	3	38	6	6	43
7	4	42	7	7	50
8	5	46	8	8	57
9	6	50	9	10	3
10	7	54	10	11	10
11	8	58	11	12	17
12	10	3	12	13	23
13	11	8	13	14	29
14	12	13	14	15	35
15	13	18	15	16	41
16	14	24	16	17	47
17	15	30	17	18	52
18	16	36	18	19	52
19	17	42	19	21	2
20	18	49	20	22	7
21	19	56	21	13	11
22	21	5	22	24	15
23	22	10	23	25	19
24	23	17	24	26	23
25	24	24	25	27	26
26	25	31	26	28	29
27	26	36	27	29	32
28	27	46	28	0 ♌	34
29	28	53	29	1	36
30	0 ♋	0	30	2	39

The Table *of the Nonageſime Degree, for the Latitude of* 8 *Degrees, continu'd.*

Cuſp 10. *Leo.* °	Nonageſime. ° ′	Cuſp 10. *Virgo.* °	Nonageſime. ° ′
0	2 ♌ 39	0	1 ♍ 14
1	3 41	1	2 8
2	4 42	2	3 1
3	5 43	3	3 53
4	6 44	4	4 46
5	7 43	5	5 38
6	8 43	6	6 30
7	9 43	7	7 22
8	10 42	8	8 14
9	11 41	9	9 5
10	12 40	10	9 57
11	13 38	11	10 48
12	14 36	12	11 39
13	15 33	13	12 30
14	16 30	14	13 20
15	17 28	15	14 11
16	18 25	16	15 2
17	19 22	17	15 53
18	20 19	18	16 43
19	21 15	19	17 34
20	22 11	20	18 24
21	23 6	21	19 14
22	23 2	22	20 5
23	24 57	23	20 55
24	25 52	24	21 45
25	26 46	25	22 35
26	27 40	26	23 25
27	28 54	27	24 15
28	29 38	28	25 6
29	0 ♍ 21	29	25 56
30	1 14	30	26 46

The Table *of the Nonageſime Degree for the Latitude of* 8 *Degrees, continued.*

Cuſp 10. *Libra.* °	Nonageſime. ° ′	Cuſp 10. *Scorpio.* °	Nonageſime. ° ′
0	26 ♍ 46	0	23 ♎ 53
1	27 37	1	23 48
2	28 27	2	24 44
3	29 18	3	25 40
4	0 ♎ 8	4	26 37
5	0 59	5	27 34
6	1 50	6	28 31
7	2 40	7	29 29
8	3 31	8	0 ♐ 26
9	4 22	9	1 24
10	5 13	10	2 23
11	6 4	11	3 22
12	6 55	12	4 22
13	7 46	13	5 22
14	8 38	14	6 22
15	9 30	15	7 23
16	10 22	16	8 24
17	11 15	17	9 26
18	12 7	18	10 28
19	12 59	19	11 31
20	13 52	20	12 34
21	14 45	21	13 38
22	15 48	22	14 43
23	16 31	23	15 48
24	17 25	24	16 52
25	18 19	25	17 57
26	19 13	26	19 2
27	20 7	27	20 8
28	21 2	28	21 15
29	21 57	29	22 22
30	22 53	30	23 29

The Table of the Nonageſime Degree, for the Latitude of 8 Degrees, continu'd.

Cuſp 10 Sagittary	Nonageſime.		Cuſp 10 Capricorn	Nonageſime.	
0	23 ♏	29	0	0 ♍	0
1	24	36	1	1	16
2	25	44	2	2	32
3	26	53	3	3	48
4	28	2	4	5	4
5	29	12	5	6	20
6	0 ♐	22	6	7	36
7	1	33	7	8	52
8	2	44	8	10	7
9	3	56	9	11	22
10	5	7	10	12	37
11	6	19	11	13	52
12	7	31	12	15	6
13	8	44	13	16	20
14	9	57	14	17	35
15	11	10	15	18	49
16	12	24	16	20	3
17	10	39	17	21	17
18	14	54	18	22	30
19	16	8	19	23	42
20	17	23	20	24	53
21	18	38	21	26	5
22	19	53	22	27	16
23	21	8	23	28	27
24	22	24	24	29	37
25	23	40	25	0 ♒	47
26	24	56	26	1	57
27	26	12	27	8	7
28	27	28	28	4	16
29	28	44	29	5	24
30	0 ♍	0	30	6	32

The Table *of the Nonageſime Degree, for the Latitude of 8 Degrees, continued.*

Cuſp 10. *Aquarius* °	Nonageſime. °		Cuſp 10. *Piſces.* °	Nonageſime. °	
0	6	♒32	0	7	♓ 7
1	7	39	1	8	3
2	8	46	2	8	58
3	9	52	3	9	53
4	10	58	4	10	47
5	12	3	5	11	41
6	13	9	6	12	35
7	14	14	7	13	29
8	15	18	8	14	22
9	16	22	9	15	15
10	17	25	10	16	8
11	18	28	11	17	1
12	19	31	12	17	53
13	20	33	13	18	45
14	21	35	14	19	38
15	22	36	15	20	30
16	23	37	16	21	22
17	24	37	17	22	14
18	25	37	18	23	5
19	26	37	19	23	56
20	27	36	20	24	47
21	28	35	21	25	38
22	29	34	22	26	29
23	0	♓33	23	27	20
24	1	31	24	28	11
25	2	28	25	29	1
26	3	25	26	29	52
27	4	21	27	0	♈42
28	5	16	28	1	33
29	7	12	29	2	23
30	7	7	30	3	11

A Table of the Nonagesime Degree, for the Latitude of 12 Degrees.

Cusp 10. *Aries.* °	Nonagesime. ° '	Cusp 10. *Taurus.* °	Nonagesime. ° '
0	4 ♈ 50	0	0 ♉ 11
1	5 44	1	1 3
2	6 33	2	1 56
3	7 23	3	2 49
4	8 13	4	3 42
5	9 1	5	4 34
6	9 51	6	5 28
7	10 41	7	6 22
8	11 33	8	7 17
9	12 22	9	8 11
10	13 13	10	9 6
11	14 2	11	10 0
12	14 52	12	10 55
13	15 42	13	11 51
14	16 33	14	12 47
15	17 23	15	13 43
16	18 13	16	14 39
17	19 3	17	15 35
18	19 54	18	16 31
19	20 44	19	17 28
20	21 35	20	18 25
21	22 26	21	19 22
22	23 17	22	20 20
23	24 7	23	21 19
24	24 59	24	22 17
25	25 51	25	23 16
26	26 42	26	24 15
27	27 34	27	25 14
28	28 26	28	26 14
29	29 18	29	27 14
30	0 ♉ 11	30	28 14

The Table *of the Nonageſime Degree, for the Latitude of* 12 *Degrees, continued.*

Cuſp 10. *Gemini.* °	Nonageſime. ° ′	Cuſp 10, *Cancer.* ° ′	Nonageſime. ° ′
0	28 ♉ 14	0	0 ♋ 0
1	29 14	1	1 6
2	0 ♊ 15	2	2 12
3	1 16	3	3 17
4	2 17	4	4 22
5	3 19	5	5 27
6	4 21	6	6 33
7	5 23	7	7 37
8	6 25	8	8 42
9	7 28	9	9 45
10	8 30	10	10 52
11	9 33	11	11 58
12	10 36	12	13 1
13	11 39	13	14 5
14	12 43	14	15 10
15	13 46	15	16 14
16	14 50	16	17 18
17	15 55	17	18 21
18	16 59	18	19 24
19	18 3	19	20 27
20	19 8	20	21 30
21	20 13	21	22 33
22	21 18	22	23 35
23	22 23	23	24 38
24	23 28	24	25 40
25	24 34	25	26 42
26	25 39	26	27 42
27	26 43	27	28 44
28	27 52	28	29 45
29	28 55	29	0 ♌ 46
30	0 ♋ 0	30	1 47

The

The Table *of the Nonageſime Degree, for the Latitude of* 12 *Degrees, continu'd.*

Cuſp 10. *Leo.* °	Nona-geſime. ° ′	Cuſp 10. *Virgo.* °	Nona-geſime. ° ′
0	1 ♌ 47	0	29 ♌ 50
1	2 46	1	0 ♍ 43
2	3 46	2	1 35
3	4 46	3	2 26
4	5 45	4	3 18
5	6 44	5	4 10
6	7 43	6	5 1
7	8 41	7	6 52
8	9 39	8	7 43
9	10 37	9	8 34
10	11 35	10	8 25
11	12 32	11	9 16
12	13 29	12	10 8
13	14 26	13	11 58
14	15 22	14	11 47
15	16 18	15	12 38
16	17 14	16	13 28
17	18 9	17	14 18
18	19 5	18	15 8
19	20 0	19	15 58
20	20 54	20	16 48
21	21 49	21	17 38
22	22 43	22	18 28
23	23 37	23	19 18
24	24 32	24	20 7
25	25 25	25	20 57
26	26 19	26	21 47
27	27 12	27	22 37
28	28 5	28	23 27
29	28 57	29	24 17
30	29 50	30	25 7

The Table of the Nonageſime Degree, for the Latitude of 12 Degrees, continued.

Cuſp 10. *Libra.*	Nonageſime.		Cuſp 10. *Scorpio.*	Nonageſime.	
♎	°	′	♏	°	′
0	25 ♐	7	0	21 ♑	14
1	25	57	1	22	9
2	26	47	2	23	6
3	27	37	3	24	2
4	28	28	4	25	0
5	29	19	5	25	57
6	0 ♑	9	6	26	55
7	0	59	7	27	53
8	1	50	8	28	51
9	2	41	9	29	50
10	3	32	10	0 ♒	50
11	4	23	11	1	50
12	5	15	12	2	51
13	6	6	13	3	51
14	6	57	14	4	53
15	7	49	15	5	54
16	8	41	16	6	56
17	9	33	17	7	59
18	10	25	18	9	2
19	11	18	19	10	6
20	12	11	20	11	10
21	13	4	21	12	15
22	13	57	22	13	20
23	14	51	23	14	26
24	15	45	24	15	32
25	16	40	25	16	39
26	17	35	26	17	45
27	18	28	27	18	53
28	19	23	28	20	1
29	20	18	29	21	9
30	21	14	30	22	18

The Table *of the Nonagesime Degree for the Latitude of* 12 *Degrees, continued.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* ° ′	Nonagesime. ° ′
0	22 ♐ 18	0	0 ♒ 0
1	23 27	1	1 18
2	24 37	2	2 58
3	25 48	3	3 57
4	26 59	4	5 15
5	28 11	5	6 34
6	29 23	6	7 52
7	0 ♑ 36	7	9 10
8	1 49	8	10 28
9	3 3	9	11 46
10	4 18	10	13 4
11	5 31	11	14 22
12	6 45	12	15 38
13	8 0	13	16 55
14	9 15	14	18 12
15	10 31	15	19 29
16	11 48	16	20 45
17	13 5	17	22 1
18	14 22	18	23 14
19	15 39	19	24 31
20	16 57	20	25 45
21	18 15	21	26 59
22	19 32	22	28 12
23	20 50	23	29 25
24	22 9	24	0 ♓ 36
25	23 27	25	1 49
26	24 41	26	3 1
27	26 4	27	4 12
28	27 22	28	5 23
29	28 41	29	6 33
30	0 ♒ 0	30	7 44

The Table *of the Nonagesime Degree for the Latitude of* 12 *Degrees, continued.*

Culp 10. *Aquarius* °	Nonagesime. °	′	Culp 10. *Pisces.* °	Nonagesime. °
0	7 ♒	44	0	8 ♓ 47
1	8	15	1	9 43
2	10	0	2	10 38
3	11	7	3	11 35
4	12	15	4	12 27
5	13	22	5	13 22
6	14	29	6	14 16
7	15	36	7	15 10
8	16	40	8	16 4
9	17	45	9	16 57
10	18	49	10	17 50
11	19	54	11	18 43
12	20	58	12	19 35
13	22	1	13	20 27
14	23	4	14	21 20
15	24	8	15	22 12
16	25	7	16	23 3
17	26	8	17	23 55
18	27	11	18	24 46
19	28	13	19	25 37
20	29	9	20	26 28
21	0 ♓	9	21	27 19
22	1	9	22	28 10
23	2	8	23	29 1
24	3	6	24	29 51
25	4	4	25	0 ♈ 42
26	5	2	26	1 33
27	5	59	27	2 23
28	6	55	28	3 13
29	7	51	29	4 5
30	8	47	30	4 50

A Table *of the* Nonagesime *Degree, to the Latitude of* 16 *Degrees.*

Cuſp 10. *Aries.* °	Nonagesime. °	′	Cuſp 10. *Taurus.* °	Nonagesime. °	′
0	6 ♈	33	0	1 ♉	55
1	7	23	1	2	27
2	8	12	2	3	19
3	9	2	3	4	11
4	9	51	4	5	3
5	10	41	5	5	55
6	11	31	6	6	48
7	12	20	7	7	41
8	13	20	8	8	35
9	13	59	9	9	28
10	14	49	10	10	22
11	15	38	11	11	15
12	16	28	12	12	9
13	17	17	13	13	3
14	18	7	14	13	58
15	18	57	15	14	53
16	19	46	16	15	48
17	20	36	17	16	43
18	21	26	18	17	38
19	22	16	19	18	33
20	23	6	20	19	29
21	23	56	21	20	25
22	24	47	22	21	22
23	25	37	23	22	20
24	26	28	24	23	17
25	27	19	25	24	15
26	28	10	26	25	13
27	28	1	27	26	11
28	29	52	28	27	9
29	0 ♉	43	29	28	8
30	1	35	30	29	6

The Table of the Nonagesime Degree, for the Latitude of 16 Degrees, continu'd.

Cuſp 10. Gemini.	Nonagesime.		Cuſp 10. Cancer.	Nonagesime.	
o	o	′	o	o	′
0	29 ♉	6	0	0 ♋	0
1	0 ♊	5	1	1	4
2	1	4	2	2	8
3	2	3	3	3	11
4	3	3	4	4	15
5	4	3	5	5	18
6	5	3	6	6	21
7	6	4	7	7	24
8	7	4	8	8	27
9	8	5	9	9	30
10	9	6	10	10	33
11	10	7	11	11	36
12	11	9	12	12	39
13	12	10	13	13	41
14	13	12	14	14	44
15	14	14	15	15	46
16	15	16	16	16	48
17	16	19	17	17	50
18	17	21	18	18	51
19	18	24	19	19	52
20	19	27	20	20	53
21	20	30	21	21	54
22	21	33	22	22	55
23	22	36	23	23	56
24	23	39	24	24	56
25	24	43	25	25	57
26	25	46	26	26	57
27	26	49	27	27	56
28	27	52	28	28	56
29	28	56	29	29	55
30	0 ♌	0	30	0 ♌	54

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The Table of the Nonagesime Degree, for the Latitude of 16 Degrees, continued.

Cusp 10. Leo. °	Nonagesime. ° '	Cusp 10. Virgo. °	Nonagesime. ° '
0	0 ♌ 54	0	28 ♎ 25
1	1 52	1	29 17
2	2 50	2	0 ♍ 8
3	3 48	3	0 59
4	4 46	4	1 50
5	5 54	5	2 41
6	6 42	6	3 31
7	7 39	7	4 22
8	8 36	8	5 12
9	9 33	9	6 3
10	10 29	10	6 53
11	11 26	11	7 43
12	12 22	12	8 33
13	13 18	13	9 24
14	14 13	14	10 14
15	15 8	15	11 4
16	16 2	16	11 54
17	16 56	17	12 43
18	17 50	18	13 33
19	18 44	19	14 22
20	19 37	20	15 12
21	20 31	21	16 1
22	21 24	22	16 51
23	22 17	23	17 40
24	23 11	24	18 29
25	24 4	25	19 19
26	24 57	26	20 9
27	25 49	27	20 58
28	26 41	28	21 47
29	27 33	29	22 37
30	28 25	30	23 27

The

The Table *of the Nonageſime Degree, for the Latitude of 16 Degrees, continued.*

Cuſp 10. *Libra.* °	Nonageſime. ° '	Cuſp 10. *Scorpio.* °	Nonageſime. ° '
0	23 ♐ 27	0	19 ♎ 34
1	24 17	1	20 30
2	25 7	2	21 27
3	25 57	3	22 24
4	26 47	4	23 22
5	27 38	5	24 20
6	28 28	6	25 18
7	29 18	7	26 17
8	0 ♑ 9	8	27 16
9	1 0	9	28 16
10	1 51	10	29 17
11	2 42	11	0 ♏ 18
12	3 34	12	1 19
13	4 25	13	2 21
14	5 16	14	3 23
15	6 7	15	4 25
16	6 59	16	5 28
17	7 51	17	6 31
18	8 43	18	7 35
19	9 36	19	8 40
20	10 29	20	9 45
21	11 22	21	10 51
22	12 15	22	11 57
23	13 9	23	13 4
24	14 3	24	14 12
25	14 58	25	15 10
26	15 53	26	16 28
27	16 48	27	17 37
28	17 43	28	18 46
29	18 38	29	19 56
30	19 34	30	21 7

The Table of the Nonagesime Degree, for the Latitude of 16 Degrees, continued.

Cusp 10. *Sagittary* ° ′	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	21 ♏ 7	0	0 ♑ 0
1	22 18	1	1 21
2	23 30	2	2 45
3	24 43	3	4 5
4	25 56	4	5 26
5	27 10	5	6 47
6	28 14	6	8 8
7	29 39	7	9 28
8	0 ♐ 54	8	10 49
9	2 10	9	12 10
10	3 26	10	13 31
11	4 42	11	14 51
12	5 58	12	16 10
13	7 15	13	17 30
14	8 33	14	18 49
15	9 52	15	20 8
16	11 11	16	21 27
17	12 30	17	22 45
18	13 50	18	24 2
19	15 10	19	25 19
20	16 30	20	26 36
21	17 51	21	27 52
22	19 11	22	29 7
23	20 32	23	0 ♒ 22
24	21 53	24	1 36
25	23 13	25	2 50
26	24 34	26	4 4
27	25 55	27	5 17
28	27 16	28	6 30
29	28 58	29	7 42
30	♑ 0	30	8 53

The Table *of the Nonageſime Degree, for the Latitude of 16 Degrees, continu'd.*

Cuſp 10. *Aquarius* °	Nonageſime. ° ′	Cuſp 10. *Piſces.* °	Nonageſime. ° ′
0	8 ♒53	0	10♓26
1	10 5	1	11 22
2	11 13	2	12 17
3	12 22	3	13 12
4	13 31	4	14 7
5	14 40	5	15 2
6	15 48	6	15 56
7	16 55	7	16 51
8	18 2	8	17 45
9	19 8	9	18 39
10	20 14	10	19 32
11	21 19	11	20 25
12	22 24	12	21 17
13	23 28	13	22 9
14	24 31	14	23 1
15	25 34	15	23 53
16	26 37	16	24 44
17	27 39	17	25 36
18	28 41	18	26 27
19	29 42	19	27 18
20	0 ♓42	20	28 9
21	1 43	21	29 0
22	2 43	22	29 51
23	3 42	23	0 ♈42
24	4 41	24	1 32
25	5 40	25	2 22
26	6 38	26	3 13
27	7 36	27	4 3
28	8 33	28	4 53
29	9 30	29	5 43
30	10 26	30	6 33

A Table of the Nonageſime Degree, for the Latitude 20 Degrees.

Cuſp 10. *Aries.* °	Nonageſime. ° ′	Cuſp 10. *Taurus.* °	Nonageſime. ° ′
0	8 ♈ 19	0	3 ♉ 2
1	9 11	1	3 53
2	9 57	2	4 44
3	10 47	3	5 35
4	11 36	4	6 27
5	12 25	5	7 18
6	13 14	6	8 10
7	14 3	7	9 1
8	14 52	8	9 54
9	15 41	9	10 46
10	16 30	10	11 38
11	17 19	11	12 30
12	18 8	12	13 23
13	18 57	13	14 16
14	19 46	14	15 10
15	20 35	15	16 4
16	21 24	16	16 58
17	22 13	17	17 52
18	23 3	18	18 46
19	24 52	19	19 40
20	24 41	20	20 34
21	25 31	21	21 30
22	26 21	22	22 25
23	27 10	23	23 21
24	28 0	24	24 17
25	28 50	25	25 13
26	29 40	26	26 9
27	0 ♉ 31	27	27 6
28	1 21	28	28 3
29	2 11	29	29 0
30	3 2	30	29 57

The Table *of the Nonageſime Degree, for the Latitude of 12 Degrees, continued.*

Cuſp 10. *Libra.*	Nonageſime.		Cuſp 10. *Scorpio.*	Nonageſime.	
°	°	′	°	°	′
0	25 ♑	7	0	21 ♎	14
1	25	57	1	22	9
2	26	47	2	23	6
3	27	37	3	24	2
4	28	28	4	25	0
5	29	19	5	25	57
6	0 ♒	9	6	26	55
7	0	59	7	27	53
8	1	50	8	28	51
9	2	41	9	29	50
10	3	32	10	0 ♏	50
11	4	23	11	1	50
12	5	15	12	2	51
13	6	6	13	3	51
14	6	57	14	4	53
15	7	49	15	5	54
16	8	41	16	6	56
17	9	33	17	7	59
18	10	25	18	9	2
19	11	18	19	10	6
20	12	11	20	11	10
21	13	4	21	12	15
22	13	57	22	13	20
23	14	51	23	14	26
24	15	45	24	15	32
25	16	40	25	16	39
26	17	35	26	17	45
27	18	28	27	18	53
28	19	23	28	20	1
29	20	18	29	21	9
30	21	14	30	22	18

The Table of the Nonagesime Degree, for the Latitude of 20 Degrees, continued.

Cusp 10. Leo.	Nonagesime.	Cusp 10. Virgo.	Nonagesime.
0	0 ♌ 3	0	27 ♌ 0
1	1 0	1	27 51
2	1 57	2	28 40
3	2 54	3	29 30
4	3 50	4	0 ♍ 20
5	4 45	5	1 10
6	5 43	6	2 0
7	6 39	7	2 50
8	7 34	8	3 39
9	8 30	9	4 29
10	9 24	10	5 19
11	10 20	11	6 8
12	11 14	12	6 57
13	12 9	13	7 47
14	13 3	14	8 37
15	13 57	15	9 26
16	14 50	16	10 15
17	15 43	17	11 4
18	16 36	18	11 52
19	17 29	19	12 41
20	18 22	20	13 30
21	19 14	21	14 19
22	20 6	22	15 8
23	20 58	23	15 57
24	21 51	24	16 46
25	22 43	25	17 35
26	23 34	26	18 24
27	24 26	27	19 13
28	25 17	28	20 2
29	26 8	29	20 52
30	27 0	30	21 41

The Table of the Nonageſime Degrees, for the Latitude of 20 Degrees, contin'd.

Cuſp 10. *Libra.*	Nonageſime.		Cuſp 10. *Scorpio.*	Nonageſime.	
o	o	/	o	o	/
0	21 ♍	41	0	17 ♎	3
1	22	31	1	18	39
2	23	20	2	19	36
3	24	10	3	20	34
4	25	1	4	21	32
5	25	50	5	22	30
6	26	39	6	23	29
7	27	29	7	24	28
8	28	20	8	25	27
9	29	10	9	26	28
10	0 ♎	1	10	27	30
11	0	51	11	28	31
12	1	43	12	29	33
13	2	34	13	0 ♏	35
14	3	25	14	1	38
15	4	16	15	2	41
16	5	7	16	3	44
17	5	59	17	4	48
18	6	51	18	5	53
19	7	44	19	6	59
20	8	37	20	8	5
21	9	30	21	9	12
22	10	23	22	10	20
23	11	17	23	11	28
24	12	11	24	12	38
25	13	6	25	13	47
26	14	1	26	14	57
27	14	56	27	16	8
28	15	51	28	17	19
29	16	47	29	18	30
30	17	43	30	19	43

The Table *of the Nonageſime Degree, for the Latitude of* 20 *Degrees, continu'd.*

Cuſp 10. *Sagittary* °	Nona-geſime. ° ′	Cuſp 10 *Capricorn* °	Nona-geſime. ° ′
0	19 ♍ 43	0	0 ♈ 0
1	20 56	1	1 25
2	22 10	2	2 51
3	23 24	3	4 16
4	24 32	4	5 41
5	25 55	5	7 5
6	27 11	6	8 29
7	28 28	7	9 53
8	29 46	8	11 17
9	1 ♐ 4	9	12 41
10	2 22	10	14 2
11	3 41	11	15 29
12	5 1	12	16 51
13	6 21	13	18 14
14	7 42	14	19 36
15	9 3	15	20 58
16	10 25	16	22 19
17	11 47	17	23 40
18	13 10	18	25 0
19	14 33	19	26 19
20	15 56	20	27 39
21	17 20	21	28 57
22	18 44	22	0 ♒ 15
23	20 8	23	1 33
24	21 32	24	2 49
25	22 56	25	4 5
26	24 20	26	5 21
27	25 45	27	6 36
28	27 10	28	7 51
29	28 35	29	9 5
30	0 ♈ 0	30	10 18

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The Table *of the Nonageſime Degree, for the Latitude of 20 Degrees, continued.*

Cuſp 10. *Aquarius* °	Nonageſime. °		Cuſp 10. *Piſces.* °	Nonageſime. ° ′	
0	10 ♒	18	0	12 ♓	18
1	11	30	1	13	14
2	12	41	2	14	9
3	13	53	3	15	5
4	15	3	4	16	0
5	16	13	5	16	55
6	17	22	6	17	49
7	18	31	7	18	43
8	19	39	8	19	37
9	20	46	9	20	31
10	21	53	10	21	24
11	23	0	11	22	17
12	24	6	12	23	9
13	25	11	13	24	1
14	26	16	14	24	53
15	27	20	15	25	45
16	28	23	16	26	36
17	29	26	17	27	27
18	0 ♓	28	18	28	18
19	1	30	19	29	9
20	2	31	20	0 ♈	0
21	3	32	21	0	50
22	4	32	22	1	41
23	5	31	23	2	31
24	6	30	24	3	21
25	7	30	25	4	11
26	8	28	26	5	1
27	9	27	27	5	51
28	10	24	28	6	40
29	11	21	29	7	30
30	12	18	30	8	19

A Table of the Nonagesime Degrees, for the Latitude of 24 Degrees.

Cusp 10. *Aries.* °	Nonagesime. ° ′
0	10 ♈ 5
1	10 54
2	11 42
3	12 31
4	13 20
5	14 8
6	14 57
7	15 45
8	16 34
9	17 22
10	18 11
11	18 59
12	19 48
13	20 36
14	21 25
15	22 13
16	23 2
17	23 50
18	24 39
19	25 28
20	26 16
21	27 5
22	27 54
23	28 43
24	29 32
25	0 ♉ 21
26	1 10
27	2 0
28	2 49
29	3 39
30	4 28

Cusp 10. *Taurus.* °	Nonagesime. ° ′
0	4 ♉ 28
1	5 18
2	6 9
3	6 59
4	7 50
5	8 40
6	9 31
7	10 21
8	11 12
9	12 3
10	12 54
11	13 45
12	14 37
13	15 29
14	16 22
15	17 15
16	18 8
17	19 1
18	19 54
19	20 47
20	21 41
21	22 34
22	23 28
23	24 22
24	25 16
25	26 10
26	27 5
27	28 0
28	28 56
29	29 52
30	0 ♊ 48

The Table of the Nonagesima Degree, for the Latitude of 24 Degrees, continu'd.

Cusp 10. Gemini.	Nonagesime.		Cusp 10. Cancer.	Nonagesime.	
0	0	43	0	0	0
1	1	44	1	1	0
2	2	40	2	2	0
3	3	36	3	3	0
4	4	33	4	4	0
5	5	30	5	4	59
6	6	27	6	5	59
7	7	24	7	6	59
8	8	21	8	7	58
9	9	19	9	8	57
10	10	17	10	9	57
11	11	15	11	10	56
12	12	13	12	11	55
13	13	11	13	12	54
14	14	9	14	13	53
15	15	8	15	14	52
16	16	7	16	15	50
17	17	6	17	16	49
18	18	5	18	17	47
19	19	4	19	18	45
20	20	4	20	19	43
21	21	3	21	20	41
22	22	2	22	21	39
23	23	1	23	22	37
24	24	1	24	23	34
25	25	1	25	24	31
26	26	0	26	25	28
27	27	0	27	26	24
28	28	0	28	27	20
29	29	0	29	28	16
30	0	0	30	29	12

The Table of the Nonagesimus Degree for the Latitude of 24 Degrees continued.

Cuſp 10. Leo. °	Nonagesime. °	′	Cuſp 10. Virgo. °	Nonagesime. °	′
0	29♋	12	0	25♌	32
1	0♌	8	1	26	22
2	1	4	2	27	11
3	1	59	3	28	1
4	2	54	4	28	50
5	3	49	5	29	39
6	4	44	6	0♍	28
7	5	38	7	1	17
8	6	32	8	2	6
9	7	26	9	2	55
10	8	19	10	3	44
11	9	13	11	4	33
12	10	6	12	5	21
13	10	59	13	6	10
14	11	52	14	6	59
15	12	45	15	7	48
16	13	38	16	8	36
17	14	30	17	9	24
18	15	22	18	10	11
19	16	14	19	11	0
20	17	6	20	11	48
21	17	57	21	12	36
22	18	48	22	13	24
23	19	39	23	14	13
24	20	30	24	15	2
25	21	21	25	15	50
26	22	12	26	16	39
27	23	2	27	17	28
28	23	52	28	18	17
29	24	42	29	19	6
30	25	32	30	19	55

The Table *of the Nonageſime Degree, for the Latitude of 24 Degrees, continued.*

Cuſp 10 *Libræ.*	Nonageſime.		Cuſp 10 *Scorpio*	Nonageſime.	
●	°	′	°	°	′
0	19 ♑	35	0	15 ♒	51
1	20	44	1	16	48
2	21	33	2	17	45
3	22	22	3	18	43
4	23	15	4	19	41
5	24	1	5	20	40
6	24	50	6	21	39
7	25	40	7	22	39
8	26	30	8	23	39
9	27	20	9	24	40
10	28	10	10	25	42
11	29	0	11	26	44
12	29	51	12	27	46
13	0 ♒	42	13	28	49
14	1	33	14	29	52
15	2	24	15	0 ♏	56
16	3	15	16	2	0
17	4	7	17	3	5
18	4	59	18	4	11
19	5	52	19	5	18
20	6	45	20	6	25
21	7	38	21	7	33
22	8	31	22	8	42
23	9	25	23	9	52
24	10	19	24	11	3
25	11	13	25	12	14
26	12	8	26	13	26
27	13	3	27	14	38
28	13	59	28	15	51
29	14	55	29	17	4
30	15	51	30	18	18

The Table of the Nonagesime Degree for the Latitude of 24 Degrees, continued.

Culp 10. Sagittary °	Nonagesime. ° ′	Culp 10. Capricorn ° ′	Nonagesime. ° ′
0	18 18	0	0 ♑ 0
1	19 33	1	1 29
2	20 49	2	2 58
3	22 5	3	4 27
4	23 22	4	5 55
5	24 40	5	7 23
6	25 58	6	8 50
7	27 17	7	10 18
8	28 37	8	11 45
9	29 57	9	13 12
10	1 ♒ 18	10	14 33
11	2 40	11	16 6
12	4 3	12	17 32
13	5 26	13	18 58
14	6 50	14	20 23
15	8 14	15	21 47
16	9 38	16	23 11
17	11 3	17	24 34
18	12 29	18	25 57
19	13 55	19	27 19
20	15 22	20	28 41
21	16 49	21	0 ♒ 2
22	18 16	22	1 23
23	19 43	23	2 43
24	21 10	24	4 2
25	22 38	25	5 20
26	24 6	26	6 38
27	25 35	27	7 55
28	27 3	28	9 12
29	28 32	29	10 28
30	0 ♓ 0	30	11 43

The Table of the Nonagesime Degree for the Latitude of 24 Degrees, continued.

Culp 10. *Aquarius* °	Nonagesime. °	′
0	11 ♒	43
1	12	57
2	14	10
3	15	23
4	16	35
5	17	46
6	18	56
7	20	6
8	21	15
9	22	24
10	23	32
11	24	40
12	25	47
13	26	54
14	28	0
15	29	5
16	0 ♓	9
17	1	12
18	2	15
19	3	17
20	4	19
21	5	20
22	6	20
23	7	20
24	8	19
25	9	19
26	10	18
27	11	17
28	12	15
29	13	12
30	14	9

Culp 10. *Pisces.* °	Nonagesime. °	′
0	14 ♓	9
1	15	5
2	16	1
3	16	57
4	17	52
5	18	47
6	19	41
7	20	35
8	21	29
9	22	23
10	23	16
11	24	9
12	25	1
13	25	53
14	26	45
15	27	36
16	28	27
17	29	18
18	0 ♈	9
19	1	0
20	1	50
21	2	40
22	3	30
23	4	20
24	5	9
25	5	59
26	6	49
27	7	38
28	8	27
29	9	16
30	10	5

A Table *of the* Nonagesime *Degree, for the Latitude of* 30 *Degrees.*

Cusp 10. *Aries.*	Nonagesime.		Cusp 10. *Taurus.*	Nonagesime.	
°	°	′	°	°	′
0	12 ♈	59	0	6 ♉	44
1	13	47	1	7	32
2	14	35	2	8	20
3	15	23	3	9	9
4	16	10	4	9	58
5	16	58	5	10	47
6	17	45	6	11	36
7	18	32	7	12	26
8	19	19	8	13	15
9	20	6	9	14	5
10	20	54	10	14	55
11	21	41	11	15	45
12	22	28	12	16	35
13	23	16	13	17	25
14	24	3	14	18	15
15	24	50	15	19	6
16	25	37	16	19	56
17	26	25	17	20	47
18	27	12	18	21	38
19	27	59	19	22	29
20	28	46	20	23	21
21	29	34	21	24	12
22	0 ♉	21	22	25	4
23	1	8	23	25	56
24	1	56	24	26	48
25	2	44	25	27	41
26	3	32	26	28	34
27	4	20	27	29	26
28	5	8	28	0 ♊	19
29	5	56	29	1	12
30	6	44	30	2	6

The Table *of the Nonageſime Degree, for the Latitude of* 30 *Degrees, continu'd.*

Cuſp 10. *Gemini.* °	Nonageſime. °	′	Cuſp 10. *Cancer.* °	Nonageſime. °	′
0	2 ♊	6	0	0 ♋	0
1	2	59	1	0	57
2	3	53	2	1	55
3	4	47	3	2	52
4	5	41	4	3	49
5	6	35	5	4	46
6	7	30	6	5	43
7	8	25	7	6	40
8	9	20	8	7	36
9	10	15	9	8	33
10	11	10	10	9	29
11	12	6	11	10	26
12	13	1	12	11	22
13	13	57	13	12	18
14	14	53	14	13	15
15	15	49	15	14	11
16	16	46	16	15	7
17	17	42	17	16	3
18	18	38	18	16	59
19	19	35	19	17	54
20	20	31	20	18	50
21	21	27	21	19	45
22	22	24	22	20	40
23	23	20	23	21	35
24	24	17	24	22	30
25	25	14	25	23	24
26	26	11	26	24	18
27	27	8	27	25	12
28	28	5	28	26	6
29	29	3	29	27	0
30	0 ♌	0	30	27	54

The

The Table of the Nonagesime Degree, for the Latitude of 52 Degrees, continued.

Cusp 10. Leo	Nonagesime.		Cusp 10. Virgo	Nonagesime.	
0	27	♋ 54	0	23	♌ 15
1	28	47	1	24	4
2	29	41	2	24	52
3	0	♌ 34	3	25	40
4	1	27	4	26	28
5	2	20	5	27	16
6	3	12	6	28	4
7	4	5	7	28	52
8	4	57	8	29	39
9	5	49	9	0	♍ 27
10	6	40	10	1	15
11	7	32	11	2	2
12	8	23	12	2	50
13	9	14	13	3	37
14	10	5	14	4	24
15	10	56	15	5	11
16	11	47	16	5	58
17	12	37	17	6	46
18	13	27	18	7	32
19	14	17	19	8	19
20	15	6	20	9	6
21	15	56	21	9	53
22	16	45	22	10	40
23	17	35	23	11	28
24	18	24	24	12	15
25	19	13	25	13	2
26	20	2	26	13	50
27	20	51	27	14	38
28	21	39	28	15	25
29	22	27	29	16	13
30	23	15	30	17	1

The Table *of the Nonageſime Degree, for the Latitude of 30 Degrees, continued.*

Cuſp 10. *Libræ.* °	Nonageſime. ° ′	Cuſp 10. *Scorpio.* °	Nonageſime. ° ′
0	17 ♑ 1	0	12 ♒ 40
1	17 49	1	13 37
2	18 37	2	14 34
3	19 25	3	15 32
4	20 13	4	16 30
5	21 2	5	17 29
6	21 50	6	18 28
7	22 39	7	19 28
8	23 28	8	20 28
9	24 17	9	21 29
10	25 7	10	22 31
11	25 56	11	23 33
12	26 46	12	24 36
13	27 36	13	25 40
14	28 27	14	26 44
15	29 18	15	27 49
16	0 ♒ 9	16	28 55
17	1 0	17	0 ♓ 2
18	1 52	18	1 9
19	2 44	19	2 17
20	3 36	20	3 26
21	4 29	21	4 36
22	5 22	22	5 47
23	6 15	23	6 58
24	7 9	24	8 10
25	8 3	25	9 23
26	8 58	26	10 37
27	9 53	27	11 51
28	10 48	28	13 6
29	11 44	29	14 23
30	12 40	30	15 40

The Table *of the Nonagesime Degrees, for the Latitude of 30 Degrees, continued.*

Cusp 10. *Sagittary*	Nonagesime.	Cusp 10. *Capricorn*	Nonagesime.
° ′	° ′	°	° ′
0	15 ♏ 50	0	0 ♑ 0
1	16 58	1	1 36
2	18 17	2	3 12
3	19 37	3	4 47
4	20 58	4	6 22
5	22 10	5	7 56
6	23 42	6	9 30
7	25 5	7	11 4
8	26 28	8	12 37
9	27 53	9	14 11
10	29 19	10	15 44
11	0 ♐ 45	11	17 16
12	2 12	12	18 48
13	3 40	13	20 19
14	5 9	14	21 50
15	7 39	15	23 20
16	8 10	16	24 50
17	9 41	17	26 19
18	11 12	18	27 47
19	12 44	19	29 15
20	14 16	20	0 ♒ 42
21	15 49	21	2 8
22	17 22	22	3 33
23	18 56	23	4 57
24	20 30	24	6 20
25	22 5	25	7 42
26	23 40	26	9 3
27	25 15	27	10 23
28	26 50	28	11 42
29	28 5	29	13 1
30	0 ♑ 0	30	14 20

The Table *of the Nonagesime Degree, for the Latitude of 30 Degrees, continued.*

Cusp 10. *Aquarius*	Nonagesime		Cusp 10. *Pisces.*	Nonagesime	
°	°	′	°	°	′
0	14 ♒	20	0	17 ♓	26
1	15	38	1	18	16
2	16	54	2	19	12
3	18	9	3	20	7
4	19	23	4	21	4
5	20	37	5	21	37
6	21	50	6	22	51
7	23	2	7	23	45
8	24	14	8	24	38
9	25	25	9	25	31
10	26	35	10	26	24
11	27	44	11	27	16
12	28	51	12	28	8
13	29	58	13	29	0
14	1	♓ 4	14	29	51
15	2	10	15	0	♈ 42
16	3	15	16	1	52
17	4	19	17	2	22
18	5	23	18	3	12
19	6	26	19	4	2
20	7	29	20	4	52
21	8	31	21	5	41
22	9	32	22	6	31
23	10	33	23	7	20
24	11	33	24	8	10
25	12	32	25	8	58
26	13	31	26	9	47
27	14	29	27	10	35
28	15	27	28	11	23
29	16	24	29	12	11
30	17	20	30	12	59

The Table *of the Nonagesime Degree, for the Latitude of 34 Degrees.*

Cusp 10. *Aries.*	Nonagesime.		Cusp 10. *Taurus.*	Nonagesime.	
°	°	′	°	°	′
0	15 ♈	4	0	8 ♉	18
1	15	51	1	9	5
2	16	38	2	9	53
3	17	24	3	10	40
4	18	10	4	11	28
5	18	57	5	12	15
6	19	44	6	13	3
7	20	30	7	13	51
8	21	46	8	14	39
9	22	2	9	15	27
10	22	49	10	16	15
11	23	35	11	17	3
12	24	22	12	17	52
13	25	8	13	18	41
14	25	54	14	19	30
15	26	40	15	20	19
16	27	26	16	21	9
17	28	12	17	21	58
18	28	59	18	22	48
19	29	45	19	23	38
20	0 ♉	32	20	24	28
21	1	18	21	25	18
22	2	4	22	26	9
23	2	51	23	26	59
24	3	37	24	27	50
25	4	24	25	28	41
26	5	11	26	29	32
27	5	58	27	0 ♊	23
28	6	45	28	1	14
29	7	31	29	2	6
30	8	18	30	2	58

The Table *of the Nonageſime Degree, for the Latitude of 34 Degrees, continued.*

Cuſp 10. *Gemini.* °	Nonageſime. ° ′
0	2 ♎ 58
1	3 50
2	4 42
3	5 35
4	6 27
5	7 20
6	8 13
7	9 6
8	10 0
9	10 53
10	11 47
11	12 40
12	13 34
13	14 28
14	15 22
15	16 16
16	17 11
17	18 5
18	19 0
19	19 55
20	20 50
21	21 44
22	22 39
23	23 34
24	24 29
25	25 24
26	26 19
27	27 14
28	28 9
29	29 5
30	0 ♋ 0

Cuſp 10. *Cancer.* ° ′	Nonageſime. ° ′
0	0 ♋ 0
1	0 55
2	1 50
3	2 46
4	3 41
5	4 36
6	5 31
7	6 26
8	7 21
9	8 16
10	9 11
11	10 6
12	11 0
13	11 55
14	12 49
15	13 43
16	14 37
17	15 31
18	16 25
19	17 19
20	18 13
21	19 7
22	20 1
23	20 54
24	21 47
25	22 40
26	23 32
27	24 25
28	25 17
29	26 9
30	27 1

The

The Table of the Nonagesime Degree, for the Latitude of 34 Degrees, continued.

Cusp 10. Leo.	Nonagesime.		Cusp 10. Virgo.	Nonagesime.	
°	°	′	°	°	′
0	27	11	0	21	44
1	27	53	1	22	29
2	28	45	2	23	16
3	29	37	3	24	2
4	☌	28	4	24	49
5	1	19	5	25	36
6	2	10	6	26	23
7	3	1	7	27	10
8	3	52	8	27	56
9	4	42	9	28	43
10	5	32	10	29	29
11	6	22	11	0	♎ 15
12	7	12	12	1	2
13	8	2	13	1	48
14	8	55	14	2	34
15	9	45	15	3	20
16	10	30	16	4	6
17	11	19	17	4	52
18	12	8	18	5	38
19	12	57	19	6	24
20	13	45	20	7	11
21	14	34	21	7	57
22	15	22	22	8	43
23	16	10	23	9	30
24	16	57	24	10	16
25	17	45	25	11	3
26	18	32	26	11	50
27	19	20	27	12	36
28	20	7	28	13	23
29	20	55	29	14	9
30	21	42	30	14	56

The Table of the Nonagesime Degree, for the Latitude of 34 Degrees, continued.

Cusp 10. Libra.	Nonagesime.		Cusp 10. Scorpio.	Nonagesime.	
°	°	′	°	°	′
0	14 ♑	56	0	10 ♒	14
1	15	43	1	11	11
2	16	30	2	12	8
3	17	17	3	13	5
4	18	4	4	14	3
5	18	52	5	15	1
6	19	40	6	16	0
7	20	28	7	17	0
8	21	16	8	18	1
9	22	5	9	19	3
10	22	54	10	20	4
11	23	43	11	21	8
12	24	32	12	22	11
13	25	21	13	23	15
14	26	11	14	24	20
15	27	1	15	25	26
16	27	51	16	26	32
17	28	42	17	27	39
18	29	33	18	28	47
19	0 ♓	24	19	29	56
20	1	16	20	1 ♏	5
21	2	8	21	2	16
22	3	0	22	3	28
23	3	53	23	4	40
24	4	46	24	5	54
25	5	39	25	7	9
26	6	33	26	8	24
27	7	27	27	9	40
28	8	22	28	10	56
29	9	18	29	12	13
30	10	14	30	13	21

The Table of the Nonagesime Degree, for the Latitude of 34 Degrees, continued.

Cuſp 10. *Sagittary* °	Nonagesime. ° ′	Cuſp 10. *Capricorn* °	Nonagesime. ° ′
0	13 ♏ 31	0	0 ♑ 0
1	14 51	1	1 42
2	16 13	2	3 23
3	17 36	3	5 4
4	19 0	4	6 45
5	20 24	5	8 25
6	21 49	6	10 5
7	23 15	7	11 44
8	24 42	8	13 23
9	26 10	9	15 2
10	27 39	10	16 40
11	29 9	11	18 17
12	0 ♐ 40	12	19 54
13	2 12	13	21 30
14	3 45	14	23 6
15	5 19	15	24 41
16	6 54	16	26 15
17	8 30	17	27 48
18	10 6	18	29 20
19	11 43	19	0 ♒ 50
20	13 21	20	2 20
21	15 0	21	3 49
22	16 39	22	5 17
23	18 18	23	6 44
24	19 57	24	8 10
25	21 37	25	9 35
26	23 17	26	11 0
27	24 57	27	12 24
28	26 38	28	13 47
29	28 19	29	15 9
30	0 ♑ 0	30	16 29

The Table of the Nonagesime Degree, for the Latitude of 34 Degrees, continued.

Cusp 10. Aquarius	Nonagesime.		Cusp 10. Pisces	Nonagesime.	
♒	°	′	♓	°	′
0	16 ♒	29	0	19 ♑	46
1	17	48	1	20	42
2	19	6	2	21	37
3	20	22	3	22	32
4	21	37	4	23	27
5	22	52	5	24	21
6	24	6	6	25	15
7	25	20	7	26	8
8	26	32	8	27	0
9	27	44	9	27	52
10	28	55	10	28	44
11	0 ♓	5	11	29	36
12	1	14	12	0 ♈	27
13	2	22	13	1	18
14	3	29	14	2	8
15	4	35	15	2	59
16	5	41	16	3	49
17	6	46	17	4	39
18	7	50	18	5	28
19	8	53	19	6	18
20	9	55	20	7	7
21	10	57	21	7	55
22	11	58	22	8	43
23	12	59	23	9	31
24	13	59	24	10	9
25	14	58	25	11	4
26	15	57	26	11	55
27	16	55	27	12	42
28	17	52	28	13	31
29	18	49	29	14	18
30	19	46	30	15	4

A Table *of the Nonag-ſime Degrees for the Latitude of 37 Degrees.*

Culp 10. *Aries.* °	Nonà-geſime. ° ′	Culp 10. *Taurus.* ° ′	Nona-geſime. ° ′
0	16 ♈ 45	0	9 ♉ 33
1	17 31	1	10 19
2	18 17	2	11 6
3	19 3	3	11 52
4	19 49	4	12 38
5	20 34	5	13 25
6	21 20	6	14 11
7	22 6	7	14 58
8	22 51	8	15 41
9	23 37	9	16 31
10	24 23	10	17 20
11	25 8	11	18 7
12	25 53	12	18 55
13	26 59	13	19 43
14	27 24	14	20 31
15	28 9	15	21 18
16	28 55	16	22 6
17	29 40	17	22 55
18	0 ♉ 25	18	23 44
19	1 10	19	24 32
20	1 55	20	25 21
21	2 41	21	26 10
22	3 26	22	27 0
23	4 12	23	27 49
24	4 58	24	28 39
25	5 43	25	29 28
26	6 29	26	0 ♊ 18
27	7 15	27	1 9
28	8 1	28	1 59
29	8 47	29	2 49
30	9 33	30	3 40

The Table of the Nonageſime Degree, for the Latitude of 37 Degrees, continu'd.

Cuſp 10. *Gemini.* °	Nonageſime. ° ′	Cuſp 10. *Cancer.* °	Nonageſime. ° ′
0	3 ♊ 40	0	0 ♋ 0
1	4 31	1	0 54
2	5 22	2	1 48
3	6 13	3	2 41
4	7 4	4	3 35
5	7 55	5	4 29
6	8 46	6	5 23
7	9 38	7	6 17
8	10 30	8	7 10
9	11 22	9	8 4
10	12 14	10	8 57
11	13 6	11	9 50
12	13 59	12	10 43
13	14 52	13	11 36
14	15 44	14	12 29
15	16 37	15	13 23
16	17 31	16	14 16
17	18 24	17	15 8
18	19 17	18	16 1
19	20 10	19	16 54
20	21 3	20	17 46
21	21 56	21	18 38
22	22 50	22	19 30
23	23 43	23	20 22
24	24 37	24	21 14
25	25 31	25	22 5
26	26 25	26	22 56
27	27 19	27	23 47
28	28 12	28	24 38
29	29 6	29	25 29
30	0 ♋ 0	30	26 20

The Table of the Nonageſime Degree, for the Latitude of 37 Degrees, continued.

Cuſp 10. *Leo* °	Nonageſime. ° ′	Cuſp 10. *Virgo.* °	Nonageſime. ° ′
0	26 ♋ 30	0	20 ♌ 27
1	27 11	1	21 13
2	28 1	2	21 39
3	28 51	3	22 45
4	29 42	4	23 31
5	0 ♌ 32	5	24 17
6	1 21	6	25 2
7	2 11	7	25 48
8	3 0	8	26 34
9	3 50	9	27 19
10	4 39	10	28 5
11	5 28	11	28 50
12	6 16	12	29 35
13	7 5	13	0 ♍ 20
14	7 54	14	1 5
15	8 42	15	1 51
16	9 29	16	2 36
17	10 17	17	3 21
18	11 5	18	4 7
19	11 52	19	4 52
20	12 42	20	5 37
21	13 28	21	6 23
22	14 15	22	7 9
23	15 2	23	7 54
24	15 49	24	8 40
25	16 35	25	9 26
26	17 22	26	10 11
27	18 8	27	10 57
28	18 54	28	11 43
29	19 41	29	12 29
30	20 27	30	13 15

The Table of the Nonagesime Degree, for the Latitude of 37 Degrees; continued.

Cusp 10. Libra. °	Nonagesime. °		Cusp 10. Scorpio. °	Nonagesime. °	
0	13 ♏	15	0	8 ♏	15
1	14	2	1	9	11
2	14	48	2	10	8
3	15	34	3	11	5
4	16	21	4	12	3
5	17	8	5	13	1
6	17	55	6	14	0
7	18	43	7	15	0
8	19	31	8	16	0
9	20	19	9	17	1
10	21	7	10	18	3
11	21	55	11	19	5
12	22	44	12	20	8
13	23	33	13	21	12
14	24	22	14	22	17
15	25	11	15	23	23
16	26	1	16	24	30
17	26	50	17	25	28
18	27	40	18	26	46
19	28	30	19	27	55
20	29	21	20	29	5
21	0 ♎	12	21	0 ♏	16
22	1	4	22	1	28
23	1	56	23	2	41
24	2	49	24	3	55
25	3	42	25	5	10
26	4	36	26	6	26
27	5	30	27	7	44
28	6	25	28	9	3
29	7	20	29	10	23
30	8	15	30	11	42

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A Table of the Nonageſime Degree, for the Latitude of 37 Degrees, continued.

Cuſp 10. Sagittary °	Nonageſime. ° '	Cuſp 10. Capricorn °	Nonageſime. ° '
0	11 ♏ 43	0	0 ♑ 0
1	13 4	1	1 46
2	14 26	2	3 32
3	15 50	3	5 18
4	17 15	4	7 4
5	18 42	5	8 50
6	20 10	6	10 35
7	21 39	7	12 20
8	23 9	8	14 2
9	24 40	9	15 47
10	26 12	10	17 29
11	27 46	11	19 11
12	29 21	12	20 52
13	0 ♐ 56	13	22 32
14	2 32	14	24 11
15	4 10	15	25 50
16	5 49	16	27 28
17	7 28	17	29 4
18	9 8	18	0 ♒ 39
19	10 49	19	2 14
20	12 31	20	3 48
21	14 13	21	5 20
22	15 56	22	6 51
23	17 40	23	8 21
24	19 25	24	9 50
25	21 10	25	11 18
26	22 56	26	12 45
27	24 42	27	14 10
28	26 38	28	15 34
29	28 14	29	16 56
30	0 ♑ 0	30	18 17

The Table *of the Nonagesime Degree for the Latitude of* 37 *Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. °	′	Cusp 10. *Pisces.* °	Nonagesime. °
0	18♒	17	0	21♓ 45
1	19	37	1	22 40
2	20	57	2	23 35
3	22	16	3	24 30
4	23	34	4	25 24
5	24	50	5	26 18
6	26	5	6	27 11
7	27	19	7	28 4
8	28	32	8	28 56
9	29	44	9	29 48
10	0	♓ 55	10	0 ♈ 39
11	2	5	11	1 30
12	3	14	12	2 30
13	4	22	13	3 10
14	5	30	14	3 59
15	6	37	15	4 49
16	7	43	16	5 38
17	8	48	17	6 27
18	9	52	18	7 16
19	10	35	19	8 5
20	11	57	20	8 53
21	12	59	21	9 41
22	14	0	22	10 29
23	15	0	23	11 17
24	16	0	24	12 5
25	16	59	25	12 52
26	17	57	26	13 39
27	18	55	27	14 26
28	19	52	28	15 12
29	20	48	29	15 58
30	21	45	30	16 45

A Table of the Nonagesime Degree, for the Latitude of 49 Degrees.

Cusp 9. Aries. °	Nonagesime. °	′	Cusp 10. Taurus. °	Nonagesime. °	′
0	18 ♈	31	0	10 ♉	51
1	19	16	1	11	36
2	20	1	2	12	21
3	20	46	3	13	6
4	21	31	4	13	51
5	22	16	5	14	37
6	23	1	6	15	22
7	23	45	7	16	8
8	24	30	8	16	54
9	25	15	9	17	40
10	25	59	10	18	26
11	26	44	11	19	13
12	27	28	12	19	59
13	28	12	13	20	46
14	28	57	14	21	32
15	29	41	15	22	19
16	0 ♉	25	16	23	6
17	1	10	17	23	53
18	1	54	18	24	41
19	2	38	19	25	29
20	3	23	20	26	17
21	4	7	21	27	5
22	4	51	22	27	53
23	5	36	23	28	41
24	6	21	24	29	29
25	7	6	25	0 ♊	18
26	7	51	26	1	6
27	8	36	27	1	55
28	9	21	28	2	44
29	10	6	29	3	33
30	10	51	30	4	22

The Table *of the Nonagesime Degree, for the Latitude of 40 Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. ° ′	Cusp 10. *Cancer.* °	Nonagesime. ° ′
0	4 ♊22	0	0 ♋ 0
1	5 11	1	0 13
2	6 1	2	1 45
3	6 51	3	2 37
4	7 41	4	3 30
5	8 31	5	4 22
6	9 21	6	5 14
7	10 12	7	6 7
8	11 3	8	6 59
9	11 53	9	7 51
10	12 44	10	8 43
11	13 35	11	9 34
12	14 26	12	10 26
13	15 17	13	11 18
14	16 8	14	12 10
15	16 59	15	13 1
16	17 50	16	13 58
17	18 42	17	14 42
18	19 34	18	15 34
19	20 26	19	16 25
20	21 17	20	17 16
21	22 9	21	18 7
22	23 1	22	18 57
23	23 53	23	19 41
24	24 46	24	20 39
25	25 38	25	21 29
26	26 30	26	22 19
27	27 23	27	23 9
28	28 15	28	25 59
29	29 7	29	24 49
30	0 ♋ 0	30	25 38

The Table of the Nonagesime Degree for the Latitude of 40 Degrees, continued.

Cusp 10. *Leo.* °	Nonagesime. ° ′	Cusp 10. *Virgo.* °	Nonagesime. ° ′
0	25 ♋ 38	0	19 ♌ 9
1	26 27	1	19 54
2	27 16	2	20 39
3	28 5	3	21 24
4	28 54	4	22 9
5	29 41	5	22 54
6	0 ♌ 31	6	23 39
7	1 19	7	24 24
8	2 7	8	25 9
9	2 55	9	25 53
10	3 43	10	26 37
11	4 31	11	27 22
12	5 19	12	28 6
13	6 7	13	28 50
14	6 54	14	29 35
15	7 41	15	2 ♍ 19
16	8 28	16	1 3
17	9 14	17	1 48
18	10 1	18	2 32
19	10 47	19	3 16
20	11 34	20	4 1
21	12 20	21	4 45
22	13 6	22	5 30
23	13 52	23	6 15
24	14 38	24	6 59
25	15 23	25	7 44
26	16 9	26	8 29
27	16 54	27	9 14
28	17 39	28	9 54
29	18 24	29	10 44
30	19 9	30	11 29

The Table *of the Nonageſime Degree, for the Latitude of 40 Degrees, continued.*

Cuſp 10. *Libra.*	Nonageſime.		Cuſp 10. *Scorpio*	Nonageſime.	
°	°	′	°	°	′
0	11	♑ 29	0	6	♒ 4
1	12	15	1	6	52
2	13	00	2	7	55
3	13	46	3	8	52
4	14	31	4	9	49
5	15	17	5	10	47
6	16	03	6	11	46
7	16	50	7	12	45
8	17	37	8	13	45
9	18	24	9	14	46
10	19	11	10	15	48
11	19	58	11	16	50
12	20	46	12	17	53
13	21	34	13	18	57
14	22	22	14	20	02
15	23	10	15	21	07
16	23	59	16	22	13
17	24	48	17	23	20
18	25	38	18	24	28
19	26	23	19	25	38
20	27	18	20	26	49
21	28	08	21	28	01
22	28	59	22	29	14
23	29	50	23	0	♏ 28
24	0	♓ 42	24	1	43
25	1	35	25	2	59
26	2	28	26	4	16
27	3	21	27	5	34
28	4	15	28	6	53
29	5	02	29	8	14
30	6	04	30	9	36

The Table *of the Nonagesime Degree, for the Latitude of* 40 *Degrees, continued.*

Cusp 10. *Sagittary* ° ′	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	9 ♏ 36	0	0 ♑ 0
1	10 59	1	1 52
2	12 24	2	3 44
3	15 50	3	5 36
4	15 17	4	7 27
5	16 46	5	9 19
6	18 16	6	11 10
7	19 48	7	13 1
8	21 21	8	14 51
9	22 55	9	16 40
10	24 30	10	18 28
11	26 7	11	20 15
12	27 45	12	22 1
13	29 24	13	23 46
14	1 ♐ 5	14	25 30
15	2 47	15	27 13
16	4 30	16	28 55
17	6 14	17	0 ♒ 36
18	7 59	18	2 15
19	9 45	19	3 53
20	11 32	20	5 30
21	13 20	21	7 5
22	15 9	22	8 39
23	16 59	23	10 12
24	18 50	24	11 44
25	20 41	25	13 14
26	22 33	26	14 43
27	24 24	27	16 10
28	26 16	28	17 36
29	28 8	29	19 1
30	0 ♑ 0	30	20 24

The Table of the Nonagesime Degrees, for the Latitude of 40 Degrees, continued.

Cusp 10. *Aquarius*	Nonagesime.		Cusp 10. *Pisces.*	Nonagesime.	
°	°	′	°	°	′
0	20 ♒	24	0	23 ♓	56
1	21	46	1	24	51
2	23	7	2	25	45
3	24	26	3	26	39
4	25	24	4	27	32
5	27	1	5	28	25
6	28	17	6	29	18
7	29	32	7	0 ♈	10
8	0 ♓	46	8	1	01
9	1	59	9	1	52
10	3	11	10	2	44
11	4	22	11	3	35
12	5	32	12	4	24
13	6	40	13	5	14
14	7	47	14	6	01
15	8	53	15	6	50
16	9	58	16	7	38
17	11	3	17	8	26
18	12	7	18	9	14
19	13	10	19	10	01
20	14	12	20	10	49
21	15	14	21	11	36
22	16	15	22	12	26
23	17	15	23	13	10
24	18	14	24	13	57
25	19	13	25	14	43
26	20	11	26	15	29
27	21	08	27	16	14
28	22	05	28	17	0
29	23	01	29	17	45
30	23	56	30	18	31

The Table *of the Nonagesime Degree, for the Latitude of* 43 *Degrees.*

Cusp 10. *Aries.* °	Nonagesime. ° ′	Cusp 10. *Taurus.* °	Nonagesime. ° ′
0	20 ♈ 24	0	12 ♉ 12
1	21 8	1	12 56
2	21 52	2	13 40
3	22 36	3	14 24
4	23 20	4	15 08
5	24 4	5	15 52
6	24 48	6	16 37
7	25 31	7	17 21
8	26 15	8	18 06
9	26 59	9	18 51
10	27 42	10	19 36
11	28 26	11	20 21
12	29 9	12	21 06
13	29 52	13	21 52
14	0 ♉ 35	14	22 37
15	1 19	15	23 28
16	2 2	16	24 09
17	2 45	17	24 55
18	3 29	18	25 41
19	4 12	19	26 27
20	4 55	20	27 14
21	5 39	21	28 0
22	6 23	22	28 47
23	7 6	23	29 34
24	7 49	24	0 ♊ 21
25	8 33	25	1 08
26	9 17	26	1 55
27	10 01	27	2 43
28	10 45	28	3 50
29	11 28	29	4 18
30	12 12	30	5 06

The Table *of the Nonageſime Degree, for the Latitude of 34 Degrees, continued.*

Cuſp 10. *Gemini.* °	Nonageſime. ° ′	Cuſp 10. *Cancer.* °	Nonageſime. ° ′
0	5 ♊ 6	0	9 ♋ 0
1	5 54	1	0 51
2	6 42	2	1 41
3	7 31	3	2 32
4	8 19	4	3 23
5	9 08	5	4 14
6	9 57	6	5 05
7	10 46	7	5 56
8	11 35	8	6 46
9	12 24	9	7 36
10	13 13	10	8 26
11	14 03	11	9 16
12	14 53	12	10 06
13	15 43	13	10 57
14	16 33	14	11 47
15	17 23	15	12 37
16	18 13	16	13 27
17	19 03	17	14 17
18	19 54	18	15 07
19	20 44	19	15 57
20	21 34	20	16 47
21	22 24	21	17 35
22	23 14	22	18 25
23	24 04	23	19 14
24	24 55	24	20 03
25	25 46	25	20 52
26	26 37	26	21 41
27	27 28	27	22 29
28	28 19	28	23 18
29	29 09	29	24 06
30	0 ♌ 0	30	24 54

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The Table of the Nonageſime Degree, for the Latitude of 43 Degrees, continu'd.

Cuſp 10. *Leo.* °	Nona-geſime ° '	Cuſp 10. *Virgo.* °	Nona-geſime. ° '
0	24 ♋ 54	0	17 ♌ 48
1	25 42	1	18 32
2	26 30	2	19 15
3	27 17	3	19 59
4	28 05	4	20 45
5	28 52	5	21 27
6	29 39	6	22 11
7	0 ♌ 26	7	22 54
8	1 13	8	23 37
9	2 0	9	24 21
10	2 46	10	25 05
11	3 33	11	25 48
12	4 19	12	26 31
13	5 05	13	27 15
14	5 51	14	27 58
15	6 37	15	28 41
16	7 23	16	29 25
17	8 ♎ 8	17	0 ♍ 08
18	8 54	18	0 51
19	9 39	19	1 34
20	10 24	20	2 18
21	11 09	21	3 01
22	11 54	22	3 45
23	12 39	23	4 39
24	13 23	24	5 12
25	14 08	25	5 56
26	14 52	26	6 40
27	15 36	27	7 24
28	16 20	28	8 08
29	17 04	29	8 52
30	17 48	30	9 36

The Table *of the Nonageſime Degree, for the Latitude of 43 Degrees, continu'd.*

Cuſp 10. *Libra.* °	Nonageſime. ° ′	Cuſp 10. *Scorpio.* °	Nonageſime. ° ′
0	9 ♑ 36	0	5 ♒ 19
1	10 21	1	4 34
2	11 06	2	5 29
3	11 51	3	6 25
4	12 35	4	7 22
5	13 20	5	8 19
6	14 05	6	9 17
7	14 50	7	10 15
8	15 36	8	11 14
9	16 22	9	12 14
10	17 08	10	13 15
11	17 54	11	14 17
12	18 41	12	15 20
13	19 21	13	16 24
14	20 14	14	17 29
15	21 01	15	18 34
16	21 49	16	19 40
17	22 37	17	20 47
18	23 25	18	21 55
19	24 14	19	23 05
20	25 03	20	24 16
21	23 53	21	25 28
22	26 43	22	26 41
23	27 33	23	27 55
24	28 24	24	29 9
25	29 15	25	0 ♓ 25
26	0 ♒ 7	26	1 42
27	0 59	27	3 1
28	1 52	28	4 22
29	2 45	29	5 44
30	3 39	30	7 8

The Table *of the Nonageſime Degree, for the Latitude 42 Degrees, continu'd.*

Cuſp 10 *Sagittary* °	Nonageſime. °	′	Cuſp 10. *Capricorn* °	Nonageſime. °	′
0	7 ♏	8	0	0 ♑	0
1	8	34	1	2	0
2	10	1	2	4	0
3	11	29	3	6	0
4	12	58	4	8	0
5	14	29	5	10	0
6	16	1	6	11	59
7	17	35	7	13	57
8	19	11	8	15	54
9	20	48	9	17	49
10	22	26	10	19	42
11	24	6	11	21	34
12	25	48	12	23	25
13	27	32	13	25	16
14	29	28	14	27	6
15	1 ♐	5	15	28	55
16	2	54	16	0 ♒	42
17	4	44	17	2	28
18	6	35	18	4	12
19	8	26	19	5	54
20	10	18	20	7	34
21	12	11	21	9	12
22	14	6	22	10	49
23	16	3	23	12	25
24	18	1	24	13	59
25	20	0	25	15	31
26	22	0	26	17	2
27	24	0	27	18	32
28	26	0	28	19	59
29	28	0	29	21	26
30	0 ♈	0	30	22	52

The Table *of the Nonageſime Degree for the Latitude of* 37 *Degrees, continued.*

Cuſp 10. *Aquarius* °	Nonageſime. ° ′	Cuſp 10. *Piſces.* °	Nonageſime. °
0	18♒17	0	21♓45
1	19 37	1	22 40
2	20 57	2	23 35
3	22 16	3	24 30
4	23 34	4	25 24
5	24 50	5	26 18
6	26 5	6	27 11
7	27 19	7	28 4
8	28 32	8	28 56
9	29 44	9	29 48
10	0 ♓55	10	0 ♈39
11	2 5	11	1 30
12	3 14	12	2 30
13	4 22	13	3 10
14	5 30	14	3 59
15	6 37	15	4 49
16	7 43	16	5 38
17	8 48	17	6 27
18	9♓52	18	7 16
19	10 35	19	8 5
20	11 57	20	8 53
21	12 59	21	9 41
22	14 0	22	10 29
23	15 0	23	11 17
24	16 0	24	12 5
25	16 59	25	12 52
26	17 57	26	13 39
27	18 55	27	14 26
28	19 52	28	15 12
29	20 48	29	15 58
30	21 45	30	16 45

A Table *of the Nonageſime Degree for the Latitude of 43 Degrees.*

Cuſp 10. *Aries.* °	Nonageſime. °	′	Cuſp 10. *Taurus.* °	Nonageſime. °	′
0	21 ♈	45	0	13 ♉	9
1	22	28	1	13	52
2	23	12	2	14	35
3	23	55	3	15	18
4	24	29	4	16	2
5	25	22	5	16	45
6	26	5	6	17	29
7	26	47	7	18	13
8	27	30	8	18	17
9	28	12	9	19	41
10	28	55	10	20	25
11	29	37	11	21	9
12	0	♉ 19	12	21	53
13	1	2	13	22	37
14	1	44	14	23	22
15	2	27	15	24	6
16	3	9	16	24	51
17	3	52	17	25	37
18	4	34	18	26	22
19	5	17	19	27	7
20	5	59	20	27	52
21	6	42	21	28	38
22	7	25	22	29	24
23	8	7	23	0	♊ 10
24	8	50	24	0	56
25	9	33	25	1	42
26	10	17	26	2	29
27	11	0	27	3	16
28	11	43	28	4	2
29	12	26	29	4	49
30	13	9	30	5	36

The Table *of the* Nonagesime *Degree, for the Latitude of* 45 *Degrees, continu'd.*

Cusp 10. *Gemini.* °	Nonagesime. ° ′	Cusp 10. *Cancer.* °	Nonagesime. ° ′
0	5 ♊ 36	0	0 ♋ 0
1	6 23	1	0 50
2	7 10	2	1 40
3	7 58	3	2 29
4	8 46	4	3 19
5	9 33	5	4 9
6	10 21	6	4 58
7	11 9	7	5 48
8	11 57	8	6 37
9	12 45	9	7 27
10	13 53	10	8 16
11	14 22	11	9 5
12	15 11	12	9 55
13	16 0	13	10 44
14	16 49	14	11 33
15	17 38	15	12 22
16	18 27	16	13 11
17	19 16	17	14 0
18	20 5	18	14 49
19	20 55	19	15 38
20	21 44	20	16 27
21	22 33	21	17 15
22	23 23	22	18 3
23	24 12	23	18 51
24	25 2	24	19 39
25	25 51	25	20 27
26	26 41	26	21 14
27	27 31	27	22 1
28	28 20	28	22 50
29	29 10	29	23 37
30	0 ♌ 0	30	24 24

The Table *of the Nonagesime Degree, for the Latitude of 45 Degrees, continued.*

Cusp 10. *Leo.* °	Nonagesime. ° ′	Cusp 10. *Virgo.* °	Nonagesime. ° ′
0	24 ♋ 24	0	16 ♌ 51
1	25 11	1	17 34
2	25 58	2	18 17
3	26 44	3	19 0
4	27 31	4	19 43
5	28 18	5	20 27
6	29 4	6	21 10
7	29 50	7	21 53
8	0 ♌ 36	8	22 35
9	1 22	9	23 18
10	2 8	10	24 1
11	2 53	11	24 43
12	3 38	12	25 26
13	4 23	13	26 8
14	5 9	14	26 51
15	5 54	15	27 33
16	6 38	16	28 16
17	7 23	17	28 58
18	8 7	18	29 41
19	8 51	19	0 ♎ 23
20	9 35	20	1 5
21	10 19	21	1 48
22	11 3	22	2 30
23	11 47	23	3 13
24	12 31	24	3 55
25	13 15	25	4 48
26	13 58	26	5 21
27	14 42	27	6 5
28	15 25	28	6 48
29	16 8	29	7 32
30	16 51	30	8 15

The Table of the Nonagesime Degree, for the Latitude of 45 Degrees, continued.

Cusp 10. Libra. °	Nonagesime. °	Cusp 10. Scorpio. °	Nonagesime. ° ′
0	8 ♍ 15	0	1 ♎ 56
1	8 58	1	2 50
2	9 42	2	3 44
3	10 26	3	4 39
4	11 19	4	5 35
5	11 55	5	6 31
6	12 39	6	7 28
7	13 23	7	8 26
8	14 8	8	9 24
9	14 53	9	10 23
10	15 38	10	11 24
11	16 24	11	12 26
12	17 10	12	13 28
13	17 56	13	14 31
14	18 42	14	15 35
15	19 28	15	16 40
16	20 15	16	17 46
17	21 2	17	18 53
18	21 49	18	20 0
19	22 37	19	21 8
20	23 26	20	22 18
21	24 15	21	23 30
22	25 5	22	24 43
23	25 55	23	25 58
24	26 45	24	27 14
25	27 36	25	28 31
26	28 37	26	29 50
27	29 29	27	1 ♏ 10
28	0 ♑ 11	28	2 31
29	1 3	29	3 53
30	1 56	30	5 17

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A Table of the Nonagesime Degree, for the Latitude of 45 Degrees, continued.

Cuſp 10. *Sagittary* °	Nonagesime. ° ′	Cuſp 10. *Capricorn* °	Nonagesime. ° ′
0	5 ♎ 17	0	0 ♑ 0
1	6 43	1	2 7
2	8 10	2	4 14
3	9 39	3	6 20
4	11 10	4	8 25
5	12 43	5	10 30
6	14 17	6	12 34
7	15 53	7	14 37
8	17 31	8	16 39
9	19 10	9	18 39
10	20 51	10	20 38
11	22 34	11	22 36
12	24 19	12	24 32
13	26 6	13	26 27
14	27 55	14	28 21
15	29 46	15	0 ♒ 14
16	1 ♏ 39	16	2 5
17	3 33	17	3 54
18	5 28	18	5 41
19	7 24	19	7 26
20	9 22	20	9 9
21	11 21	21	10 50
22	13 21	22	12 29
23	15 23	23	14 7
24	17 26	24	15 43
25	19 30	25	17 17
26	21 35	26	18 50
27	23 40	27	20 21
28	25 46	28	21 50
29	27 53	29	23 17
30	0 ♐ 0	30	24 43

The

The Table *of the Nonageſime Degree, for the Latitude of* 45. *Degrees, continued.*

Cuſp 10. *Aquarius*	Nonageſime.	Cuſp 10. *Piſces.*	Nonageſime.
°	° ′	°	° ′
0	24 ♒ 43	0	28 ♓ 4
1	26 07	1	28 57
2	27 29	2	29 49
3	28 50	3	0 ♈ 41
4	0 ♓ 10	4	1 53
5	1 29	5	2 24
6	2 46	6	3 15
7	4 01	7	4 05
8	5 17	8	4 55
9	6 30	9	5 45
10	7 42	10	6 34
11	8 52	11	7 23
12	10 0	12	8 11
13	11 7	13	8 58
14	12 14	14	9 45
15	13 20	15	10 32
16	14 25	16	11 18
17	15 29	17	12 04
18	16 32	18	12 50
19	17 44	19	13 36
20	18 36	20	14 22
21	19 37	21	15 07
22	20 36	22	15 52
23	21 34	23	16 37
24	22 32	24	17 21
25	23 29	25	18 05
26	24 25	26	18 50
27	25 21	27	19 34
28	26 16	28	20 18
29	27 10	29	21 02
30	28 04	30	21 45

A Table of the Nonagesime Degree, for the Latitude 46 Degrees.

Culp. 10. *Aries.*	Nonagesime.	Culp. 10. *Taurus.*	Nonagesime.
°	° ′	°	° ′
0	♈ 25	0	♉ 37
1	23 9	1	14 1
2	23 51	2	15 2
3	24 35	3	15 46
4	25 18	4	16 28
5	26 0	5	17 11
6	26 42	6	17 53
7	27 24	7	18 38
8	28 7	8	19 22
9	28 50	9	20 5
10	29 32	10	20 49
11	♉ 16	11	21 33
12	3 57	12	22 17
13	1 38	13	23 1
14	2 20	14	23 45
15	3 2	15	24 29
16	3 45	16	25 13
17	4 26	17	25 58
18	5 8	18	26 43
19	5 51	19	27 28
20	6 33	20	28 13
21	7 15	21	28 58
22	7 58	22	29 44
23	8 40	23	♊ 29
24	9 22	24	1 15
25	10 4	25	2 0
26	10 47	26	2 46
27	11 29	27	3 32
28	12 12	28	4 19
29	12 55	29	5 5
30	13 37	30	5 51

The Table *of the Nonagesime Degree, for the Latitude of 46 Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer* °	Nonagesime. °	′
0	5 ♊	51	0	0 ♋	0
1	6	38	1	0	50
2	7	25	2	1	39
3	8	12	3	2	28
4	8	59	4	3	17
5	9	46	5	4	6
6	10	33	6	4	55
7	11	21	7	5	45
8	12	9	8	6	34
9	12	56	9	7	22
10	13	44	10	8	11
11	14	32	11	9	0
12	15	21	12	9	49
13	16	9	13	10	37
14	16	57	14	11	25
15	17	46	15	12	14
16	18	34	16	13	3
17	19	22	17	13	51
18	20	11	18	14	39
19	21	0	19	15	28
20	21	49	20	16	16
21	22	37	21	17	4
22	23	26	22	17	51
23	24	15	23	18	39
24	25	5	24	19	26
25	25	54	25	20	13
26	26	42	26	21	1
27	27	32	27	21	48
28	28	21	28	22	35
29	29	10	29	23	22
30	0 ♋	0	30	24	9

The Table *of the Nonagesime Degree for the Latitude of 46 Degrees, continued.*

Cusp 10. *co.*	Nonagesime.		Cusp 10. *Virgo.*	Nonagesime.	
	°	′		°	′
0	24 ♋	9	0	16 ♌	23
1	24	55	1	17	5
2	25	41	2	17	48
3	26	27	3	18	30
4	27	13	4	19	13
5	28	0	5	19	55
6	28	45	6	20	38
7	29	30	7	21	20
8	0 ♌	16	8	22	2
9	1	1	9	22	45
10	1	46	10	23	27
11	2	32	11	24	9
12	3	17	12	24	51
13	4	1	13	25	34
14	4	46	14	26	15
15	5	31	15	26	58
16	6	15	16	27	40
17	6	59	17	28	28
18	7	43	18	29	4
19	8	27	19	29	46
20	9	11	20	0 ♍	28
21	9	55	21	1	10
22	10	38	22	1	53
23	11	21	23	2	35
24	12	5	24	3	18
25	12	49	25	4	0
26	13	32	26	4	42
27	14	14	27	5	25
28	14	58	28	6	8
29	15	51	29	6	50
30	16	23	30	7	35

The Table of the Nonagesime Degree, for the Latitude of 46 Degrees, continued.

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	7	35	0	1	3
1	8	17	1	1	56
2	9	1	2	2	50
3	9	44	3	3	45
4	10	28	4	4	40
5	11	12	5	5	36
6	11	56	6	6	32
7	12	40	7	7	31
8	13	24	8	8	30
9	14	9	9	9	28
10	14	63	10	10	29
11	15	38	11	11	30
12	16	25	12	12	31
13	17	10	13	13	34
14	17	56	14	14	37
15	18	42	15	15	41
16	19	29	16	16	48
17	21	15	17	17	55
18	21	2	18	19	2
19	22	50	19	20	10
20	23	38	20	21	21
21	23	26	21	22	32
22	24	15	22	23	44
23	25	4	23	24	59
24	25	54	24	26	14
25	26	35	25	27	30
26	27	36	26	28	48
27	28	27	27	0	8
28	29	18	28	1	29
29	0	10	29	2	51
30	1	3	30	4	15

The Table of *the Nonagesime Degree, for the Latitude of 46 Degrees, continued.*

Cuſp 10. *Sagittary*	Nonageſime.		Cuſp 10. *Capricorn*	Nonageſime.	
°	°	′	°	°	′
0	4 ♏	55	0	0 ♒	9
1	5	43	1	2	12
2	7	13	2	4	21
3	8	43	3	6	29
4	10	13	4	8	39
5	11	45	5	10	46
6	13	19	6	12	52
7	14	57	7	15	0
8	16	38	8	17	5
9	18	17	9	19	9
10	20	0	10	21	11
11	21	45	11	23	11
12	23	32	12	25	11
13	25	19	13	27	9
14	27	9	14	29	3
15	29	2	15	0 ♓	58
16	0 ♐	56	16	2	51
17	2	51	17	4	43
18	4	49	18	6	28
19	6	49	19	8	15
20	8	49	20	10	0
21	10	50	21	11	42
22	12	54	22	13	22
23	15	0	23	15	03
24	17	8	24	16	40
25	19	14	25	18	14
26	21	23	26	19	47
27	23	31	27	21	17
28	25	39	28	22	47
29	27	48	29	24	17
30	0 ♑	0	30	25	45

The Table of the Nonageſime Degree, for the Latitude of 46 Degrees, continu'd.

Cuſp 10. *Aquarius* °	Nonageſime. ° ′	Cuſp 10. *Piſces.* °	Nonageſime. ° ′
0	25 ♒ 45	0	28 ♓ 57
1	27 09	1	29 50
2	28 31	2	0 ♈ 42
3	29 52	3	1 33
4	1 ♓ 11	4	2 24
5	2 30	5	3 15
6	3 46	6	4 06
7	5 01	7	4 56
8	6 15	8	5 44
9	7 28	9	6 33
10	8 39	10	7 21
11	9 49	11	8 09
12	10 58	12	8 57
13	12 04	13	9 45
14	13 12	14	10 31
15	14 18	15	11 17
16	15 22	16	12 04
17	16 26	17	12 43
18	17 28	18	13 35
19	18 30	19	14 21
20	19 31	20	15 06
21	20 31	21	15 51
22	21 30	22	16 36
23	22 29	23	17 20
24	23 27	24	18 04
25	24 24	25	18 48
26	25 20	26	19 32
27	26 15	27	20 16
28	27 10	28	20 59
29	28 04	29	21 42
30	28 57	30	22 25

The Table of the Nonagesime Degree, for the Latitude of 48 Degrees.

Cusp 10. Aries. °	Nonagesime. °	′	Cusp 10. Taurus. °	Nonagesime. °	′
0	23 ♈	53	0	14 ♉	38
1	24	37	1	15	20
2	25	19	2	16	02
3	26	00	3	16	44
4	26	42	4	17	26
5	27	24	5	18	09
6	28	05	6	18	51
7	28	46	7	19	33
8	29	27	8	20	16
9	0 ♉	09	9	20	58
10	0	50	10	21	40
11	1	32	11	22	23
12	2	13	12	23	05
13	2	54	13	23	48
14	3	35	14	24	31
15	4	16	15	25	14
16	4	57	16	25	58
17	5	38	17	26	42
18	6	19	18	27	26
19	7	01	19	28	10
20	7	43	20	28	54
21	8	23	21	29	39
22	9	05	22	0 ♊	25
23	9	46	23	1	07
24	10	28	24	1	52
25	11	09	25	2	37
26	11	51	26	3	22
27	12	32	27	4	07
28	13	14	28	4	53
29	13	56	29	5	38
30	14	38	30	6	23

The Table *of the* Nonagesime *Degree, for the Latitude of* 48 *Degrees, continued.*

Cusp 10. *Gemini.* °	Nonagesime. ° ′	Cusp 10. *Cancer.* ° ′	Nonagesime. ° ′
0	6 ♎ 23	0	0 ♑ 0
1	7 08	1	0 49
2	7 54	2	1 37
3	8 40	3	2 25
4	9 26	4	3 13
5	10 13	5	4 01
6	10 59	6	4 49
7	11 46	7	5 37
8	12 32	8	6 25
9	13 19	9	7 13
10	14 05	10	8 0
11	14 52	11	8 48
12	15 39	12	9 36
13	16 26	13	10 24
14	17 13	14	11 12
15	18 01	15	11 59
16	18 48	16	12 47
17	19 36	17	13 34
18	20 24	18	14 21
19	21 12	19	15 08
20	22 0	20	15 55
21	22 47	21	16 41
22	23 35	22	17 29
23	24 33	23	18 14
24	25 11	24	19 01
25	25 59	25	19 47
26	26 47	26	20 34
27	27 35	27	21 20
28	28 23	28	22 06
29	29 11	29	22 52
30	0 ♑ 0	30	23 37

The Table *of the Nonageſime Degree for the Latitude 48 Degrees, continued.*

Cuſp 10. *Leo.* °	Nonageſime. ° ′
0	23 ♋ 37
1	24 22
2	25 07
3	25 53
4	26 38
5	27 23
6	28 08
7	28 53
8	29 37
9	0 ♌ 21
10	1 06
11	1 50
12	2 34
13	3 18
14	4 02
15	4 46
16	5 29
17	6 12
18	6 55
19	7 37
20	8 20
21	9 02
22	9 44
23	10 27
24	11 09
25	11 51
26	12 34
27	13 16
28	13 58
29	14 40
30	15 22

Cuſp 10. *Virgo.* °	Nonageſime. ° ′
0	15 ♌ 22
1	16 04
2	16 46
3	17 28
4	18 09
5	18 51
6	19 32
7	20 14
8	20 55
9	21 37
10	22 18
11	22 59
12	23 41
13	24 22
14	25 03
15	25 44
16	26 25
17	27 06
18	27 47
19	28 28
20	29 10
21	29 51
22	2 ♍ 33
23	1 14
24	1 55
25	2 36
26	3 18
27	4 0
28	4 41
29	5 23
30	6 05

The Table *of the* Nonagesime *Degree, for the Latitude of* 48 *Degrees, continu'd.*

Cusp 10. *Libra.* °	Nonagesime ° ′	Cusp 10. *Scorpio.* °	Nonagesime. ° ′
0	6 ♍ 5	0	29 ♍ 4
1	6 47	1	29 56
2	7 30	2	0 ♎ 49
3	8 13	3	1 43
4	8 55	4	2 37
5	9 38	5	3 32
6	10 21	6	4 28
7	11 04	7	5 24
8	11 47	8	6 21
9	12 31	9	7 18
10	13 15	10	8 15
11	14 0	11	9 16
12	14 44	12	10 17
13	15 28	13	11 20
14	16 13	14	12 23
15	16 58	15	13 27
16	17 44	16	14 31
17	18 49	17	15 36
18	19 15	18	16 43
19	20 02	19	17 51
20	20 49	20	19 1
21	21 56	21	20 13
22	22 24	22	21 26
23	23 12	23	22 40
24	24 01	24	23 55
25	24 50	25	25 11
26	25 40	26	26 28
27	26 30	27	27 47
28	27 21	28	29 8
29	28 12	29	0 ♏ 31
30	29 4	30	1 56

The Table of the Nonagesime Degree, for the Latitude of 48 Degrees, continued.

Cusp 10. Sagittary °	Nonagesime. ° ′	Cusp 10. Capricorn °	Nonagesime. ° ′
0	1 ♏ 56	0	0 ♑ 0
1	3 23	1	2 49
2	4 52	2	4 36
3	6 23	3	6 54
4	7 56	4	9 12
5	9 31	5	11 29
6	11 08	6	13 45
7	12 47	7	15 59
8	14 28	8	18 11
9	16 11	9	20 21
10	17 56	10	22 29
11	19 43	11	24 36
12	21 33	12	26 41
13	23 26	13	28 44
14	25 21	14	0 ♒ 44
15	27 18	15	2 42
16	29 16	16	4 39
17	1 ♐ 16	17	6 34
18	3 19	18	8 27
19	4 24	19	10 17
20	7 31	20	12 04
21	9 39	21	13 49
22	11 49	22	15 32
23	14 01	23	17 13
24	16 15	24	18 52
25	18 31	25	20 29
26	20 48	26	21 04
27	23 06	27	23 37
28	25 24	28	25 08
29	27 41	29	26 37
30	0 ♑ 0	30	28 04

The Table of the Nonagesime Degrees, for the Latitude of 48 Degrees, continued.

Cusp 10. Aquarius.	Nonagesime.		Cusp 10. Pisces.	Nonagesime.	
°	°	'	°	°	'
0	28 ♒	4	0	0 ♈	56
1	29	29	1	1	48
2	0 ♓	52	2	2	39
3	2	13	3	3	30
4	3	32	4	4	20
5	4	49	5	5	10
6	6	05	6	5	59
7	7	20	7	6	48
8	8	34	8	7	36
9	9	47	9	8	24
10	10	59	10	9	11
11	12	09	11	9	58
12	13	17	12	10	45
13	14	24	13	11	31
14	15	29	14	12	16
15	16	33	15	13	02
16	17	37	16	13	47
17	18	40	17	14	32
18	19	43	18	15	16
19	20	44	19	16	0
20	21	44	20	16	45
21	22	42	21	17	29
22	23	39	22	18	13
23	24	36	23	18	56
24	25	32	24	19	39
25	26	28	25	20	22
26	27	23	26	21	05
27	28	17	27	21	47
28	29	11	28	22	30
29	0 ♈	04	29	23	13
30	0	56	30	23	55

A Table of the Nonageſime Degrees for the Latitude 51 Degrees.

Cuſp 10. *Aries.* °	Nonageſime. °	′	Cuſp 10. *Taurus.* °	′	Nonageſime. °	′
0	26 ♈	14	0		10 ♉	12
1	26	55	1		16	53
2	27	35	2		17	33
3	28	15	3		18	14
4	28	56	4		18	54
5	29	36	5		19	35
6	0 ♉	16	6		20	16
7	0	56	7		20	57
8	1	36	8		21	38
9	2	16	9		22	19
10	2	56	10		23	0
11	3	36	11		23	41
12	4	15	12		24	22
13	4	55	13		25	4
14	5	35	14		25	46
15	6	14	15		26	28
16	6	54	16		27	12
17	7	34	17		27	52
18	8	13	18		28	34
19	8	53	19		29	17
20	9	33	20		0 ♊	0
21	10	13	21		0	42
22	10	53	22		1	25
23	11	33	23		2	08
24	12	12	24		2	51
25	12	52	25		3	34
26	13	32	26		4	18
27	14	12	27		5	02
28	14	52	28		5	45
29	15	32	29		6	29
30	16	12	30		7	13

The Table *of the Nonagesime Degree, for the Latitude of 51 Degrees, continu'd.*

Cusp 10. *Gemini.*	Nonagesime.		Cusp 10. *Cancer.*	Nonagesime.	
°	°	′	°	°	′
0	7 ♊	13	0	0 ♋	0
1	7	57	1	0	47
2	8	42	2	1	33
3	9	26	3	2	19
4	10	11	4	3	6
5	10	55	5	3	52
6	11	40	6	4	38
7	12	25	7	5	25
8	13	09	8	6	11
9	13	54	9	6	57
10	14	39	10	7	44
11	15	25	11	8	30
12	16	10	12	9	16
13	16	55	13	10	2
14	17	41	14	10	48
15	18	27	15	11	33
16	19	12	16	12	12
17	19	58	17	13	4
18	20	44	18	13	50
19	21	30	19	14	35
20	22	16	20	15	21
21	23	03	21	16	6
22	23	49	22	16	51
23	24	35	23	17	36
24	25	22	24	18	20
25	26	8	25	19	5
26	26	54	26	19	50
27	27	41	27	20	34
28	28	27	28	21	28
29	29	23	29	22	3
30	0 ♌	0	30	22	47

The Table of the Nonagesime Degree, for the Latitude of 51 Degrees, continued.

Cusp 10. Leo. °	Nonagesime. ° '
0	22 ♋ 47
1	23 31
2	24 15
3	24 58
4	25 42
5	26 26
6	27 9
7	27 52
8	28 55
9	29 18
10	0 ♌ 0
11	0 43
12	1 26
13	2 8
14	2 50
15	3 32
16	4 14
17	4 56
18	5 38
19	6 19
20	7 0
21	7 41
22	8 22
23	9 3
24	9 44
25	10 25
26	11 6
27	11 46
28	12 27
29	13 7
30	13 48

Cusp 10. Virgo. °	Nonagesime. ° '
0	13 ♌ 48
1	14 28
2	15 8
3	15 48
4	16 28
5	17 8
6	17 48
7	18 27
8	19 7
9	19 47
10	20 26
11	21 6
12	21 47
13	22 26
14	23 6
15	23 46
16	24 25
17	25 5
18	25 45
19	26 25
20	27 4
21	27 44
22	28 24
23	29 4
24	29 44
25	0 ♍ 24
26	1 4
27	1 45
28	2 25
29	3 5
30	3 46

The Table of the Nonagesime Degree, for the Latitude of 51 Degrees, continued.

Cusp 10. *Libra.* °	Nonagesime. ° '	Cusp 10. *Scorpio.* °	Nonagesime. ° '
0	3 ♑ 46	0	25 ♑ 51
1	4 26	1	26 41
2	5 7	2	27 32
3	5 48	3	28 24
4	6 30	4	29 16
5	7 11	5	0 ♒ 9
6	7 52	6	1 3
7	8 34	7	1 58
8	9 16	8	2 53
9	9 18	9	3 49
10	10 41	10	4 46
11	11 23	11	5 43
12	12 6	12	6 42
13	12 49	13	7 42
14	13 32	14	8 43
15	14 15	15	9 45
16	14 58	16	10 48
17	15 42	17	11 52
18	16 26	18	12 58
19	17 11	19	14 4
20	17 57	20	15 12
21	18 41	21	16 21
22	19 28	22	17 32
23	20 15	23	18 44
24	21 1	24	19 58
25	21 48	25	21 14
26	22 36	26	22 31
27	23 24	27	23 50
28	24 12	28	25 11
29	25 1	29	26 33
30	25 51	30	27 57

A Table *of the Nonageſime Degree, for the Latitude 51 Degrees, continued.*

Cuſp 10. *Sagittary* °	Nonageſime. ° ′	Cuſp 10. *Capricorn* °	Nonageſime. ° ′
0	27 ♎ 57	0	0 ♍ 0
1	29 23	1	2 36
2	0 ♏ 52	2	5 11
3	2 24	3	7 45
4	3 58	4	10 17
5	5 35	5	12 48
6	7 15	6	15 16
7	8 57	7	17 43
8	10 41	8	20 9
9	12 27	9	22 32
10	14 15	10	24 52
11	16 7	11	27 9
12	18 2	12	29 26
13	20 0	13	1 ♐ 40
14	22 0	14	3 50
15	24 3	15	5 57
16	26 10	16	8 0
17	28 20	17	10 0
18	0 ♐ 34	18	11 58
19	2 50	19	13 53
20	5 8	20	15 45
21	7 28	21	17 33
22	9 51	22	19 19
23	12 16	23	21 3
24	14 43	24	22 45
25	17 12	25	24 25
26	19 43	26	26 2
27	22 15	27	27 36
28	24 49	28	29 8
29	27 24	29	0 ♑ 37
30	0 ♍ 0	30	2 3

The Table of the Nonagesime Degree, for the Latitude of 51 Degrees, continued.

Cusp 10. Aquarius °	Nonagesime. °	′
0	2 ♐	3
1	3	27
2	4	49
3	6	10
4	7	29
5	8	49
6	10	2
7	11	16
8	12	28
9	13	39
10	14	48
11	15	56
12	17	2
13	18	8
14	19	12
15	20	15
16	21	17
17	22	18
18	23	18
19	24	17
20	25	14
21	26	13
22	27	7
23	28	2
24	28	57
25	29	51
26	0 ♑	44
27	1	36
28	2	28
29	3	19
30	4	2

Cusp 10. Pisces. °	Nonagesime. °	′
0	4 ♈	9
1	4	59
2	5	48
3	6	36
4	7	24
5	8	12
6	8	59
7	9	45
8	10	32
9	11	18
10	12	3
11	12	49
12	13	34
13	14	18
14	15	2
15	15	45
16	16	28
17	17	11
18	17	54
19	18	57
20	19	19
21	20	2
22	20	44
23	21	26
24	22	8
25	22	49
26	23	30
27	24	12
28	24	53
29	25	34
30	26	14

A Table of the Nonagesime Degree, for the Latitude of 52. Degrees 20 Minutes.

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	27 ♈	18	0	17 ♉	12
1	27	40	1	17	41
2	28	10	2	18	22
3	28	42	3	19	2
4	29	2	4	19	43
5	29	43	5	20	23
6	0 ♉	23	6	21	3
7	1	7	7	21	42
8	2	41	8	22	23
9	3	17	9	22	41
10	3	56	10	23	21
11	4	37	11	23	41
12	5	18	12	24	22
13	5	53	13	25	42
14	6	32	14	26	23
15	7	11	15	27	4
16	7	50	16	27	44
17	8	30	17	28	26
18	9	10	18	29	7
19	9	51	19	29	49
20	10	27	20	0 ♊	31
21	11	10	21	1	13
22	11	48	22	1	55
23	12	21	23	2	37
24	13	17	24	3	20
25	13	46	25	4	3
26	14	27	26	4	45
27	15	4	27	5	28
28	15	45	28	6	11
29	16	25	29	6	54
30	17	12	30	7	36

The Table of the Nonagesime Degree, for the Latitude of 52 Degrees 20 Minutes, continued.

Cusp 10. Gemini.	Nonagesime.		Cusp 10. Cancer.	Nonagesime.	
°	°	′	°	°	′
0	7 ♐	36	0	0 ♑	0
1	8	19	1	0	46
2	9	03	2	1	31
3	9	46	3	2	17
4	10	30	4	3	03
5	11	14	5	3	48
6	11	58	6	4	34
7	12	42	7	5	19
8	13	26	8	6	04
9	14	10	9	6	50
10	14	55	10	7	35
11	15	39	11	8	20
12	16	24	12	9	06
13	17	09	13	9	51
14	17	54	14	10	36
15	18	39	15	11	21
16	19	24	16	12	06
17	20	09	17	12	51
18	20	54	18	13	36
19	21	39	19	14	21
20	22	24	20	15	05
21	23	09	21	15	20
22	23	55	22	16	34
23	24	40	23	17	18
24	25	26	24	18	02
25	26	12	25	18	46
26	26	57	26	19	30
27	27	43	27	20	14
28	28	29	28	20	57
29	29	14	29	21	41
30	0 ♑	0	30	22	24

The Table *of the Nonageſime Degree for the Latitude of* 52 *Degrees* 20 *Minutes, continued.*

Cuſp 10. *Leo.* °	Nona-geſime. ° ′
0	22 ♋ 24
1	23 07
2	23 50
3	24 33
4	25 16
5	25 58
6	26 41
7	27 23
8	28 06
9	28 48
10	29 30
11	0 ♌ 12
12	0 54
13	1 36
14	2 17
15	2 58
16	3 39
17	4 20
18	5 01
19	5 42
20	6 22
21	7 03
22	7 44
23	8 24
24	9 04
25	9 44
26	10 24
27	11 04
28	11 44
29	12 24
30	13 03

Cuſp 10. *Virgo.* °	Nona-geſime. ° ′
0	13 ♌ 3
1	13 43
2	14 22
3	15 01
4	15 41
5	16 20
6	16 59
7	17 39
8	18 18
9	18 57
10	19 36
11	20 15
12	20 54
13	21 33
14	22 12
15	22 51
16	23 30
17	24 09
18	24 48
19	25 27
20	26 06
21	26 45
22	27 24
23	28 04
24	28 43
25	29 23
26	0 ♍ 02
27	0 42
28	1 21
29	2 01
30	2 42

The Table of the Nonageſime Degree, for the Latitude of 52 Degrees, 20 Minutes, continued.

Cuſp 10. *Libra.* °	Nonageſime. ° ′
0	2 ♍ 42
1	3 22
2	4 2
3	4 42
4	5 22
5	6 2
6	6 43
7	7 23
8	8 5
9	8 46
10	9 27
11	10 10
12	10 53
13	11 34
14	12 16
15	13 0
16	13 43
17	14 26
18	15 8
19	15 54
20	16 36
21	17 21
22	18 7
23	18 54
24	19 39
25	20 26
26	21 13
27	22 0
28	22 47
29	23 38
30	24 23

Cuſp 10. *Scorpio.* °	Nonageſime. ° ′
0	24 ♍ 23
1	25 12
2	26 2
3	26 54
4	27 41
5	28 36
6	29 30
7	0 ♎ 24
8	1 20
9	2 14
10	3 9
11	4 7
12	5 6
13	6 5
14	7 4
15	8 4
16	9 6
17	10 8
18	11 12
19	12 18
20	13 25
21	14 35
22	15 41
23	16 52
24	18 5
25	19 18
26	20 56
27	21 53
28	23 14
29	24 37
30	26 1

The Table *of the Nonagesime Degree, for the Latitude of 52 Degrees 20 Minutes, continued.*

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	26 ♎ 1	0	0 ♍ 0
1	27 27	1	2 44
2	28 56	2	5 27
3	0 ♏ 26	3	8 8
4	2 0	4	10 49
5	3 37	5	13 29
6	5 16	6	16 7
7	6 58	7	18 42
8	8 45	8	21 15
9	10 31	9	23 45
10	12 28	10	26 12
11	14 14	11	28 35
12	16 11	12	0 ♎ 56
13	18 12	13	2 15
14	20 16	14	5 28
15	22 24	15	7 38
16	24 35	16	9 45
17	26 48	17	11 49
18	29 6	18	13 50
19	1 ♐ 26	19	15 45
20	3 50	20	17 41
21	6 16	21	19 27
22	8 46	22	21 19
23	11 18	23	23 3
24	13 54	24	24 45
25	16 32	25	26 24
26	19 12	26	28 0
27	21 53	27	29 34
28	24 34	28	1 ♓ 5
29	27 17	29	2 34
30	0 ♍ 0	30	3 59

The

The Table of the Nonagesime Degree, for the Latitude of 52 Degrees 20 Minutes, continu'd.

Cusp 10. *Aquarius* °	Nonagesime. °	′
0	5 ♓	59
1	5	25
2	6	49
3	8	8
4	9	26
5	10	42
6	11	57
7	13	10
8	14	21
9	15	31
10	16	39
11	17	46
12	18	52
13	19	56
14	20	57
15	22	0
16	23	0
17	23	59
18	24	58
19	25	57
20	26	53
21	27	49
22	28	45
23	29	39
24	0 ♈	32
25	1	25
26	2	16
27	3	6
28	3	56
29	4	47
30	5	37

Cusp 10. *Pisces.* °	Nonagesime. °	′
0	5 ♈	37
1	6	26
2	7	14
3	8	2
4	8	50
5	9	37
6	10	23
7	11	8
8	11	54
9	12	39
10	13	27
11	14	8
12	14	33
13	15	34
14	16	18
15	17	1
16	17	44
17	18	26
18	19	8
19	19	50
20	20	32
21	21	13
22	21	54
23	22	31
24	23	16
25	23	57
26	24	37
27	25	18
28	25	58
29	26	38
30	27	18

The Table *of the Nonagesime Degree, for the Latitude of 53 Degrees 22 Minutes.*

Cusp 10. *Aries.* °	Nonagesime. °	′	Cusp 10. *Taurus.* °	Nonagesime. °	′
0	28 ♈	11	0	17 ♉	51
1	28	51	1	18	30
2	29	30	2	19	9
3	0 ♉	9	3	19	48
4	0	48	4	20	25
5	1	28	5	21	4
6	2	8	6	21	43
7	2	48	7	22	22
8	3	28	8	23	1
9	4	8	9	23	40
10	4	48	10	24	20
11	5	26	11	25	0
12	6	6	12	25	40
13	6	46	13	26	29
14	7	25	14	27	0
15	8	5	15	27	38
16	8	45	16	28	18
17	9	25	17	29	0
18	10	4	18	29	40
19	10	43	19	0 ♊	20
20	11	21	20	1	0
21	11	59	21	1	40
22	12	41	22	2	21
23	13	18	23	3	2
24	13	50	24	3	43
25	14	35	25	4	23
26	15	14	26	5	5
27	15	53	27	5	46
28	16	33	28	6	29
29	17	12	29	7	12
30	17	31	30	7	54

The Table of the Nonageſime Degree, for the Latitude of 53 Degrees 22 Minutes, continu'd.

Cuſp 10. *Gemini.* °	Nonageſime. ° '	Cuſp 10. *Cancer.* °	Nonageſime. ° '
0	7 ♊ 54	0	0 ♋ 0
1	8 37	1	0 46
2	9 21	2	1 31
3	10 4	3	2 16
4	10 47	4	3 0
5	11 30	5	3 45
6	12 13	6	4 30
7	12 56	7	5 14
8	13 39	8	5 59
9	14 22	9	6 44
10	15 6	10	7 28
11	15 49	11	8 12
12	16 33	12	8 57
13	17 17	13	9 42
14	18 1	14	10 26
15	18 46	15	11 11
16	19 30	16	11 56
17	20 15	17	12 40
18	20 59	18	13 24
19	21 44	19	14 9
20	22 29	20	14 53
21	23 14	21	15 37
22	23 58	22	16 21
23	24 43	23	17 5
24	25 29	24	17 49
25	26 14	25	18 34
26	26 58	26	19 18
27	27 44	27	20 1
28	28 29	28	20 43
29	29 14	29	21 26
30	0 ♋ 0	30	22 6

The Table *of the Nonagesime Degree for the Latitude of 53 Degrees 22 Minutes, continued.*

Cusp 10. *Leo.* °	Nonagesime. ° ′	Cusp 10. *Virgo.* °	Nonagesime. ° ′
0	22 ♋ 6	0	12 ♌ 09
1	22 48	1	12 48
2	23 31	2	13 27
3	24 15	3	14 06
4	24 55	4	14 44
5	25 37	5	15 22
6	26 19	6	16 01
7	26 58	7	16 41
8	27 40	8	17 20
9	28 22	9	18 09
10	29 03	10	18 48
11	29 45	11	19 27
12	0 ♌ 26	12	20 06
13	1 07	13	20 45
14	1 48	14	21 24
15	2 29	15	22 03
16	3 09	16	22 43
17	3 49	17	23 22
18	4 29	18	24 01
19	5 09	19	24 40
20	5 48	20	25 19
21	6 27	21	25 58
22	7 06	22	26 37
23	7 45	23	27 16
24	8 24	24	27 55
25	9 02	25	28 34
26	9 39	26	29 13
27	10 18	27	29 52
28	10 57	28	2 ♍ 31
29	11 34	29	1 10
30	12 09	30	1 49

Cusp 10. *Libra.* °	Nonagesime. °	'
0	1 ♎	49
1	2	29
2	3	08
3	3	48
4	5	28
5	5	08
6	5	48
7	6	28
8	7	08
9	7	49
10	8	30
11	9	10
12	9	51
13	10	31
14	11	12
15	11	54
16	12	36
17	13	16
18	13	57
19	14	42
20	15	25
21	16	09
22	16	55
23	17	39
24	18	24
25	19	10
26	19	57
27	20	44
28	21	30
29	22	18
30	23	06

Cusp 10. *Scorpio.* °	Nonagesime. °	'
0	25 ♎	6
1	23	54
2	24	44
3	25	36
4	26	24
5	27	15
6	28	06
7	28	58
8	29	51
9	0 ♏	44
10	1	37
11	2	33
12	3	29
13	4	26
14	5	26
15	6	26
16	7	27
17	8	30
18	9	33
19	10	37
20	11	44
21	12	53
22	14	02
23	15	12
24	16	24
25	17	[illegible]
26	18	54
27	20	12
28	21	33
29	22	54
30	24	17

The Table of the Nonagesime Degree, for the Latitude of 53 Degrees 22 Minutes, continu'd.

Cusp 10. Sagittary °	Nonagesime. ° ′	Cusp 10. Capricorn °	Nonagesime. ° ′
0	24 ♐ 17	0	0 ♑ 0
1	25 34	1	2 52
2	27 15	2	5 40
3	28 46	3	8 27
4	0 ♏ 21	4	11 16
5	2 0	5	14 0
6	3 39	6	16 43
7	5 22	7	19 26
8	7 10	8	22 02
9	8 58	9	24 37
10	10 51	10	27 08
11	12 47	11	29 35
12	14 47	12	2 ♒ 01
13	16 51	13	4 22
14	18 06	14	6 39
15	21 07	15	8 53
16	23 21	16	11 04
17	25 36	17	13 09
18	27 57	18	15 12
19	0 ♐ 22	19	17 12
20	2 50	20	19 08
21	5 21	21	21 03
22	7 55	22	22 51
23	10 31	23	24 38
24	13 14	24	26 23
25	15 58	25	28 03
26	18 44	26	29 40
27	21 30	27	1 ♓ 14
28	24 17	28	2 46
29	27 06	29	4 16
30	0 ♑ 0	30	5 43

The Table *of the Nonageſime Degree, for the Latitude of 53 Degrees 22 Minutes, continued.*

Cuſp 10. *Aquarius* °	Nonageſime. ° ′	Cuſp 10. *Piſces.* °	Nonageſime. ° ′
0	5 ♑43	0	6 ♈54
1	7 05	1	7 42
2	8 25	2	8 28
3	9 45	3	9 17
4	11 01	4	10 01
5	12 17	5	10 46
6	13 29	6	11 31
7	14 40	7	12 15
8	15 49	8	12 59
9	16 59	9	13 43
10	18 07	10	14 26
11	19 14	11	15 10
12	20 18	12	15 53
13	21 21	13	16 36
14	22 24	14	17 19
15	23 25	15	18 01
16	24 25	16	18 44
17	25 25	17	19 25
18	26 23	18	20 07
19	27 20	19	20 48
20	28 16	20	21 29
21	29 11	21	22 10
22	0 ♈04	22	22 54
23	0 58	23	23 32
24	1 51	24	24 12
25	2 43	25	24 52
26	3 35	26	25 32
27	4 25	27	26 13
28	5 13	28	26 53
29	6 05	29	27 32
30	6 54	30	28 11

A Table *of the Nonageſime Degrees for the Latitude of 54 Degrees.*

Cuſp 10. *Aries.* °	Nonageſime. ° ′	Cuſp 10. *Taurus.* ° ′	Nonageſime. ° ′
0	28 ♈ 47	0	17 ♉ 54
1	29 27	1	18 33
2	0 ♉ 4	2	19 12
3	0 42	3	19 51
4	1 21	4	20 30
5	1 59	5	21 09
6	2 38	6	21 48
7	3 16	7	22 27
8	3 54	8	23 07
9	4 32	9	23 46
10	5 10	10	24 25
11	5 48	11	25 05
12	6 26	12	25 46
13	7 04	13	26 26
14	7 42	14	27 06
15	8 21	15	27 46
16	8 59	16	28 26
17	9 37	17	29 08
18	10 15	18	29 49
19	10 53	19	0 ♊ 29
20	11 31	20	1 10
21	12 09	21	1 51
22	12 47	22	2 32
23	13 25	23	3 13
24	14 03	24	3 54
25	14 41	25	4 36
26	15 20	26	5 18
27	15 58	27	6 0
28	16 37	28	6 42
29	17 15	29	7 24
30	17 54	30	8 06

The Table *of the Nonageſime Degree, for the Latitude of 54. Degrees, continu'd.*

Cuſp 10. *Gemini.*	Nonageſime.	Cuſp 10. *Cancer.*	Nonageſime.
°	° '	°	° '
0	8 ♏ 6	0	0 ♑ 0
1	8 49	1	0 45
2	9 31	2	1 29
3	10 14	3	2 14
4	10 56	4	2 58
5	11 39	5	3 43
6	12 22	6	4 27
7	13 05	7	5 12
8	13 49	8	5 57
9	14 32	9	6 41
10	15 16	10	7 25
11	15 59	11	8 10
12	16 43	12	8 54
13	17 26	13	9 38
14	18 10	14	10 22
15	18 54	15	11 06
16	19 38	16	11 50
17	20 22	17	12 34
18	21 06	18	13 17
19	21 50	19	14 01
20	22 35	20	14 44
21	23 19	21	15 18
22	24 03	22	16 11
23	24 48	23	16. 41
24	25 33	24	17 38
25	26 17	25	18 21
26	27 02	26	19 04
27	27 46	27	19 46
28	28 31	28	20 29
29	29 15	29	21 11
30	9 ♐ 0	30	21 54

The Table of the Nonagesime Degree, for the Latitude of 54 Degrees, continued.

Cuſp 10. Leo. °	Nonageſime. ° '	Cuſp 10. Virgo. °	Nonageſime. ° '
0	21 ♋ 54	0	12 ♌ 6
1	22 36	1	12 45
2	23 18	2	13 23
3	24 0	3	14 02
4	24 42	4	14 40
5	25 24	5	15 19
6	26 6	6	15 57
7	26 47	7	16 35
8	27 28	8	17 13
9	28 09	9	17 51
10	28 50	10	18 29
11	29 31	11	19 07
12	0 ♌ 12	12	19 45
13	0 53	13	20 23
14	1 34	14	21 01
15	2 14	15	21 39
16	2 54	16	22 18
17	3 34	17	22 56
18	4 14	18	23 34
19	4 55	19	24 13
20	5 35	20	24 50
21	6 14	21	25 28
22	6 53	22	26 06
23	7 33	23	26 44
24	8 12	24	27 22
25	8 51	25	28 01
26	9 30	26	28 39
27	10 09	27	29 18
28	10 48	28	29 56
29	11 27	29	0 ♍ 35
30	12 06	30	1 13

The Table of the Nonagesime Degree, for the Latitude of 52 Degrees, continued.

Cusp 10. Libra.	Nonagesime.		Cusp 10. Scorpio.	Nonagesime.	
o	°	′	o	°	′
0	11 ♑	13	0	22 ♑	14
1	12	52	1	23	02
2	23	31	2	23	50
3	30	10	3	24	39
4	31	49	4	25	29
5	41	28	5	26	19
6	51	07	6	27	10
7	52	47	7	28	02
8	6	27	8	28	55
9	7	08	9	29	49
10	7	48	10	0 ♒	43
11	8	29	11	1	38
12	9	10	12	2	34
13	9	51	13	3	30
14	10	32	14	4	27
15	11	13	15	5	26
16	11	54	16	6	26
17	12	35	17	7	27
18	13	18	18	8	30
19	14	0	19	9	34
20	14	43	20	10	40
21	15	26	21	11	47
22	16	10	22	12	55
23	16	54	23	14	04
24	17	39	24	15	15
25	18	24	25	16	28
26	19	09	26	17	43
27	19	54	27	18	59
28	20	40	28	20	17
29	21	27	29	21	38
30	22	14	30	23	02

The Table of the Nonagesime Degree, for the Latitude of 54 Degrees, ascending.

Cusp 10. Sagittary °	Nonagesime. ° ′		Cusp 10. Capricornus °	Nonagesime. ° ′	
0	23	2	0	0	0
1	24	28	1	3	0
2	25	56	2	5	57
3	27	25	3	8	52
4	28	57	4	11	46
5	0	33	5	14	38
6	2	12	6	17	28
7	3	54	7	20	15
8	5	40	8	23	0
9	7	30	9	25	41
10	9	24	10	28	17
11	11	21	11	0	50
12	13	20	12	3	18
13	15	23	13	5	43
14	17	30	14	8	02
15	19	41	15	10	19
16	21	58	16	12	30
17	24	17	17	14	37
18	26	42	18	16	40
19	29	10	19	18	39
20	1	43	20	20	36
21	4	19	21	22	30
22	7	10	22	24	20
23	9	45	23	26	06
24	12	32	24	27	48
25	15	22	25	29	27
26	18	14	26	1	3
27	21	8	27	2	35
28	24	[illegible]	28	4	04
29	27	0	29	5	32
30	0	0	30	6	58

The Table of the Nonagesime Degrees, for the Latitude of [illegible] Degrees, continu'd.

Cusp 10. Aquarius °	Nonagesime °	′	Cusp 10. Pisces °	Nonagesime °	′
0	6 ♓	58	0	7 ♈	46
1	8	22	1	8	33
2	9	43	2	9	20
3	11	01	3	10	06
4	12	17	4	10	51
5	13	32	5	11	36
6	14	45	6	12	21
7	15	56	7	13	06
8	17	05	8	13	50
9	18	13	9	14	34
10	19	20	10	15	17
11	20	26	11	16	0
12	21	30	12	16	42
13	22	33	13	17	24
14	23	34	14	18	06
15	24	34	15	18	47
16	25	33	16	19	28
17	26	30	17	20	09
18	27	26	18	20	50
19	28	22	19	21	31
20	29	17	20	22	12
21	0 ♈	11	21	22	52
22	1	05	22	23	33
23	1	58	23	24	13
24	2	50	24	24	53
25	3	41	25	25	32
26	4	31	26	26	11
27	5	21	27	26	50
28	6	10	28	27	29
29	6	58	29	28	08
30	7	46	30	28	47

A Table of the Nonagesime Degrees for the Latitude of 57 Degrees.

Cusp 10. Aries.	Nonagesime.		Cusp 10. Taurus.	Nonagesime.	
°	°	′	°	°	′
0	1	034	0	19	045
1	2	10	1	20	21
2	2	47	2	20	58
3	3	23	3	21	35
4	4	0	4	22	12
5	4	36	5	22	49
6	5	13	6	23	27
7	5	49	7	24	04
8	6	25	8	24	42
9	7	02	9	25	20
10	7	38	10	25	58
11	8	14	11	26	36
12	8	50	12	27	14
13	9	26	13	27	52
14	10	02	14	28	30
15	10	38	15	29	08
16	11	14	16	29	47
17	11	51	17	0	♊26
18	12	27	18	1	05
19	13	03	19	1	44
20	13	39	20	2	23
21	14	15	21	3	03
22	14	52	22	3	42
23	15	28	23	4	22
24	16	04	24	5	01
25	16	41	25	5	41
26	17	18	26	6	21
27	17	54	27	7	01
28	18	31	28	7	41
29	19	08	29	8	21
30	19	51	30	9	01

The Table of the Nonagesime Degree, for the Latitude of 57 Degrees continued.

Cusp 10. *Gemini.* °	Nonagesime. °	′	Cusp 10. *Cancer.* °	Nonagesime. °	′
0	9 ♊	1	0	0 ♋	0
1	9	42	1	0	43
2	10	23	2	1	26
3	11	04	3	2	09
4	11	45	4	2	52
5	12	26	5	3	34
6	13	07	6	4	17
7	13	48	7	4	59
8	14	30	8	5	42
9	15	11	9	6	24
10	15	23	10	7	07
11	16	34	11	7	49
12	17	16	12	8	31
13	17	58	13	9	14
14	18	40	14	9	56
15	19	22	15	10	38
16	20	04	16	11	20
17	20	46	17	12	02
18	21	29	18	12	44
19	22	11	19	13	26
20	22	53	20	14	07
21	23	36	21	14	49
22	24	18	22	15	30
23	25	01	23	16	12
24	25	43	24	16	53
25	26	26	25	17	34
26	27	08	26	18	15
27	27	51	27	18	56
28	28	34	28	19	37
29	29	17	29	20	18
30	0 ♋	0	30	20	59

The

The Table of the Nonagesime Degree for the Latitude of 57 Degrees, continued.

Cusp 10. Leo. °	Nonagesime. °	′
0	29 ♋	59
1	21	39
2	22	19
3	22	59
4	23	39
5	24	19
6	24	59
7	25	38
8	26	18
9	26	57
10	27	37
11	28	16
12	28	55
13	29	34
14	0 ♌	13
15	0	52
16	1	30
17	2	08
18	2	46
19	3	24
20	4	02
21	4	40
22	5	18
23	5	56
24	6	33
25	7	11
26	7	48
27	8	25
28	9	02
29	9	39
30	10	15

Cusp 10. Virgo. °	Nonagesime. °	′
0	10 ♌	15
1	10	52
2	11	29
3	12	06
4	12	42
5	13	19
6	13	56
7	14	32
8	15	08
9	15	45
10	16	21
11	16	57
12	17	33
13	18	09
14	18	46
15	19	22
16	19	58
17	20	34
18	21	10
19	21	46
20	22	22
21	22	58
22	23	35
23	24	11
24	24	47
25	25	24
26	26	0
27	26	37
28	27	13
29	27	50
30	28	26

The Table of the Nonagesime Degree, for the Latitude of 57 Degrees, continued.

Cusp 10. *Libra.* °	Nonagesime. ° '
0	28♌26
1	29 03
2	29 40
3	0♍16
4	0 53
5	1 30
6	2 07
7	2 44
8	3 22
9	3 59
10	4 37
11	5 15
12	5 53
13	6 31
14	7 10
15	7 49
16	8 28
17	9 07
18	9 47
19	10 27
20	11 07
21	11 48
22	12 29
23	13 10
24	13 51
25	14 33
26	15 15
27	15 58
28	16 41
29	17 24
30	18 08

Cusp 10. *Scorpio* °	Nonagesime. ° '
0	18♍08
1	18 52
2	19 37
3	20 23
4	21 09
5	21 56
6	22 44
7	23 32
8	24 21
9	25 11
10	26 01
11	26 52
12	27 44
13	28 37
14	29 31
15	♎26
16	1 21
17	2 18
18	3 16
19	4 15
20	5 15
21	6 17
22	7 20
23	8 24
24	9 30
25	10 38
26	11 49
27	13 02
28	14 16
29	15 32
30	16 50

A Table of the Nonagesime Degree, for the Latitude of 57 Degrees, continued.

Cuſp 10. *Sagittary* °	Nonagesime. ° ′	Cuſp 10. *Capricorn* °	Nonagesime. ° ′
0	16 ♎ 50	0	0 ♈ 0
1	18 11	1	3 40
2	19 35	2	7 16
3	21 02	3	10 47
4	22 32	4	14 16
5	24 05	5	17 41
6	25 42	6	21 01
7	27 22	7	24 17
8	29 05	8	27 26
9	0 ♏ 52	9	0 ♉ 31
10	2 45	10	3 30
11	4 43	11	6 21
12	6 46	12	9 04
13	8 53	13	11 39
14	11 07	14	14 10
15	13 25	15	16 35
16	15 50	16	18 53
17	18 21	17	21 07
18	20 56	18	23 14
19	23 39	19	25 17
20	26 30	20	27 15
21	29 29	21	29 08
22	2 ♐ 34	22	0 ♊ 55
23	5 43	23	2 38
24	8 59	24	4 18
25	12 19	25	5 45
26	15 44	26	7 28
27	19 13	27	8 58
28	22 44	28	10 25
29	26 20	29	11 49
30	0 ♑ 0	30	13 10

The Table of the Nonagesime Degree, for the Latitude of 57 Degrees, continued.

Cusp 10. Aquarius		Nonagesime.	
°	′	°	′
0		13 ♑	10
1		14	28
2		15	44
3		16	58
4		18	11
5		19	22
6		20	30
7		21	36
8		22	40
9		23	43
10		24	45
11		25	45
12		26	44
13		27	42
14		28	39
15		29	34
16		0 ♈	29
17		1	23
18		2	16
19		3	08
20		3	59
21		4	49
22		5	39
23		6	28
24		7	16
25		8	04
25		8	51
27		9	37
28		10	23
29		11	08
30		11	52

Cusp 10. Capricorn		Nonagesime.	
°		°	′
0		11 ♈	52
1		12	36
2		13	19
3		14	02
4		14	46
5		15	29
6		16	09
7		16	50
8		17	32
9		18	12
10		18	53
11		19	33
12		20	13
13		20	53
14		21	32
15		22	11
16		22	50
17		23	29
18		24	07
19		24	45
20		25	23
21		26	01
22		26	38
23		27	16
24		27	53
25		28	30
26		29	07
27		29	44
28		0 ♉	20
29		0	57
30		1	34

A Table of the Nonageſime Degree, for the Latitude of 49 Degrees.

Cuſp 10. Arias. °	Nonageſime. ° ′	Cuſp 10. Taurus. °	Nonageſime. ° ′
0	4 ♉ 19	0	21 ♉ 43
1	5 13	1	22 18
2	5 47	2	22 53
3	6 21	3	23 28
4	6 55	4	24 04
5	7 29	5	24 39
6	8 03	6	25 15
7	8 37	7	25 50
8	9 11	8	26 26
9	9 44	9	27 02
10	10 18	10	27 38
11	10 52	11	28 14
12	11 26	12	28 50
13	12 0	13	29 26
14	12 34	14	0 ♊ 03
15	13 08	15	0 39
16	13 42	16	1 16
17	14 16	17	1 52
18	14 50	18	2 29
19	15 24	19	3 06
20	15 58	20	3 43
21	16 32	21	4 21
22	17 07	22	4 59
23	17 41	23	5 36
24	18 16	24	6 14
25	18 50	25	6 52
26	19 25	26	7 29
27	19 59	27	8 07
28	20 34	28	8 45
29	21 08	29	9 24
30	21 43	30	10 02

The Table of the Nonagesime Degrees, for the Latitude of 60 Degrees, continued.

Cusp 10. Gemini. °	Nonagesime. ° '	Cusp 10. Cancer. °	Nonagesime. ° '
0	10 ♊ 2	0	0 ♋ 0
1	10 40	1	0 41
2	11 19	2	1 22
3	11 58	3	2 03
4	12 37	4	2 43
5	13 16	5	3 23
6	13 55	6	4 04
7	14 35	7	4 45
8	15 14	8	5 25
9	15 54	9	6 06
10	16 33	10	6 46
11	17 13	11	7 27
12	17 52	12	8 07
13	18 32	13	8 48
14	19 12	14	9 28
15	19 52	15	10 08
16	20 32	16	10 48
17	21 12	17	11 28
18	21 53	18	12 08
19	22 33	19	12 47
20	23 14	20	13 27
21	23 54	21	14 06
22	24 35	22	14 46
23	25 15	23	15 25
24	25 56	24	16 05
25	26 37	25	16 44
26	27 17	26	17 33
27	27 57	27	18 02
28	28 38	28	18 41
29	29 19	29	19 20
30	0 ♋ 0	30	19 58

The Table of the Nonagesime Degree for the Latitude of 52 Degrees, continued.

Cusp 10. Leo.	Nonagesime.		Cusp 10. Virgo.	Nonagesime.	
°	°	′	°	°	′
0	19 ♋	58	0	8 ♌	17
1	20	36	1	8	52
2	21	15	2	9	26
3	21	53	3	10	01
4	22	31	4	10	35
5	23	08	5	11	10
6	23	46	6	11	44
7	24	24	7	12	19
8	25	01	8	12	53
9	25	39	9	13	28
10	26	17	10	14	02
11	26	54	11	14	36
12	27	31	12	15	10
13	28	08	13	15	44
14	28	44	14	16	18
15	29	21	15	16	52
16	29	57	16	17	26
17	0 ♌	34	17	18	0
18	1	10	18	18	34
19	1	46	19	19	08
20	2	22	20	19	42
21	2	58	21	20	16
22	3	34	22	20	49
23	4	10	23	21	23
24	4	45	24	21	57
25	5	21	25	22	31
26	5	56	26	23	05
27	6	32	27	23	39
28	7	07	28	24	13
29	7	42	29	24	47
30	8	17	30	25	21

The Table *of the Nonagesime Degree, for the Latitude of 60 Degrees, continu'd.*

Cusp 10. *Libra.* °	Nonagesime. °	′	Cusp 10. *Scorpio.* °	Nonagesime. °	′
0	25 ♌	21	0	13 ♍	29
1	25	55	1	14	09
2	26	30	2	14	50
3	27	04	3	15	31
4	27	38	4	16	12
5	28	13	5	16	54
6	28	47	6	17	36
7	29	21	7	18	19
8	29	56	8	19	03
9	0 ♍	31	9	19	47
10	1	06	10	20	32
11	1	42	11	21	17
12	2	17	12	22	03
13	2	53	13	22	50
14	3	28	14	23	38
15	4	04	15	24	27
16	4	40	16	25	17
17	5	16	17	26	07
18	5	52	18	26	58
19	6	29	19	27	50
20	7	05	20	28	44
21	7	42	21	29	39
22	8	19	22	0 ♎	35
23	8	57	23	1	32
24	9	53	24	2	31
25	10	13	25	3	32
26	10	52	26	4	34
27	11	31	27	5	38
28	12	10	28	6	43
29	12	49	29	7	51
30	13	29	30	9	01

The

The Table of the Nonagesime Degree, for the Latitude of 60 Degrees, continued.

Cusp 10. Sagittary	Nonagetime.		Cusp 10. Capricorn	Nonagetime.	
0			0		
0	9 ♎	1	0	0 ♑	0
1	10	14	1	4	52
2	11	29	2	9	37
3	12	47	3	14	18
4	14	07	4	18	55
5	15	31	5	23	20
6	17	0	6	27	30
7	18	32	7	1	♒26
8	20	07	8	5	10
9	21	47	9	8	43
10	23	33	10	12	05
11	25	23	11	15	17
12	27	19	12	18	13
13	29	12	13	20	58
14	1	♏35	14	23	36
15	3	55	15	26	05
16	6	24	16	28	25
17	9	02	17	0	♓38
18	11	47	18	2	41
19	14	43	19	4	37
20	17	55	20	6	27
21	21	17	21	8	13
22	24	50	22	9	53
23	28	34	23	11	28
24	2	♐30	24	13	0
25	6	40	25	14	29
26	11	05	26	15	52
27	15	42	27	17	13
28	20	23	28	18	31
29	25	08	29	19	46
30	0	0	30	20	59

The Table *of the Nonageſime Degree, for the Latitude of 60 Degrees, continued.*

Cuſp 10. *Aquarius* °	Nonageſime. ° '	Cuſp 10. *Piſces.* °	Nonageſime. ° '
0	20 ♑ 59	0	16 ♈ 61
1	22 09	1	17 11
2	23 17	2	17 50
3	24 22	3	18 29
4	25 26	4	19 08
5	26 28	5	19 47
6	27 29	6	20 25
7	28 28	7	21 03
8	29 25	8	21 41
9	0 ♈ 21	9	22 18
10	1 16	10	22 55
11	2 10	11	23 31
12	3 02	12	24 08
13	3 53	13	24 44
14	4 43	14	25 20
15	5 33	15	25 56
16	6 22	16	26 32
17	7 10	17	27 07
18	7 57	18	27 43
19	8 43	19	28 18
20	9 28	20	28 54
21	10 13	21	29 29
22	10 57	22	08 04
23	11 41	23	0 ♉ 39
24	12 24	24	1 13
25	13 06	25	1 47
26	13 48	26	2 22
27	14 29	27	2 56
28	15 10	28	3 30
29	15 51	29	4 05
30	16 31	30	4 39

A Table of the Nonagesime Degrees, for the Latitude of 57 Degrees, continued.

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	16 ♎ 50	0	0 ♈ 0
1	18 11	1	3 40
2	19 35	2	7 16
3	21 02	3	10 47
4	22 32	4	14 16
5	24 05	5	17 41
6	25 42	6	21 01
7	27 22	7	24 17
8	29 05	8	27 26
9	0 ♏ 52	9	0 ♓ 31
10	2 45	10	3 30
11	4 43	11	6 21
12	6 46	12	9 04
13	8 53	13	11 39
14	11 07	14	14 10
15	13 25	15	16 35
16	15 50	16	18 53
17	18 21	17	21 07
18	20 56	18	23 14
19	23 39	19	25 17
20	26 30	20	27 15
21	29 29	21	29 08
22	2 ♐ 34	22	0 ♒ 55
23	5 43	23	2 38
24	8 59	24	4 18
25	12 19	25	5 45
26	15 44	26	7 28
27	19 13	27	8 58
28	22 44	28	10 25
29	26 20	29	11 49
30	0 ♑ 0	30	13 10

A

TABLE

OF THE

ANGLE ORIENT,

OR

Altitude of the Nonageſime Degree.

A Table of the Angle Orient, or Altitude of the Nonagesime Degree.

Ascen.		0		1		Ascen.	
	°	°	′	°	′	°	′
♈	0	66	31	65	31	30	♎
	3	66	31	65	31	27	
	6	66	35	65	35	24	
	9	66	45	65	45	21	
	12	66	55	65	55	18	
	15	67	10	66	10	15	
	18	67	30	66	30	12	
	21	67	50	66	50	9	
	24	68	20	67	20	6	
	27	68	45	67	45	3	
♉	0	69	20	68	26	0	♐
	3	69	55	68	55	27	
	6	70	55	69	35	24	
	9	71	15	70	15	21	
	12	72	0	71	0	18	
	15	72	50	71	50	15	
	18	73	45	72	45	12	
	21	74	40	73	40	9	
	24	75	35	74	35	6	
	27	76	35	75	35	3	
♊	0	77	40	76	40	0	♑
	3	78	45	77	45	27	
	6	79	50	78	50	24	
	9	81	05	80	5	21	
	12	82	15	81	15	18	
	15	83	35	82	30	15	
	18	84	50	83	45	12	
	21	86	5	85	0	9	
	24	87	25	86	20	6	
	27	88	40	87	35	3	
♋	0	90	0	88	55	0	♒

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		0		1		Ascen.	
♑	0	90	0	88	55	30	♈
	3	89	55	89	45	27	
	6	87	25	88	30	24	
	9	86	05	87	10	21	
	12	84	50	85	55	18	
	15	83	35	84	40	15	
	18	82	20	83	25	12	
	21	81	05	82	10	9	
	24	80	05	81	5	6	
	27	78	50	79	55	3	
♌	0	77	35	78	45	0	♉
	3	76	35	77	40	27	
	6	75	35	76	40	24	
	9	74	40	75	45	21	
	12	73	50	74	50	18	
	15	72	55	73	55	15	
	18	72	0	73	5	12	
	21	71	15	72	20	9	
	24	70	30	71	35	6	
	27	70	0	71	0	3	
♍	0	69	25	70	25	0	♊
	3	68	45	69	50	27	
	6	68	20	69	20	24	
	9	67	55	68	55	21	
	12	67	30	68	30	18	
	15	67	05	68	10	15	
	18	66	55	67	55	12	
	21	66	45	67	45	9	
	24	66	35	67	35	6	
	27	66	31	67	31	3	
♎	0	66	31	67	31	0	♋

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.	2		3		Ascen.
	♑		♑		♒
♈ 0	64	30	63	30	30 ♓
3	64	32	63	32	27
6	64	35	63	35	24
9	64	45	63	45	21
12	64	55	63	55	18
15	65	10	64	10	15
18	65	30	64	50	12
21	65	50	64	50	9
24	66	15	65	25	6
27	66	45	65	45	3
♉ 0	67	20	66	20	0 ♑
3	67	55	66	55	27
6	68	35	67	30	24
9	69	15	68	10	21
12	70	0	69	0	18
15	70	50	69	45	15
18	71	40	70	35	12
21	72	35	71	30	9
24	73	35	72	30	6
27	74	35	73	30	3
♊ 0	75	35	74	30	0 ♒
3	76	40	75	35	27
6	77	50	76	45	24
9	79	0	77	50	21
12	80	10	79	05	18
15	81	23	80	20	15
18	82	40	81	35	12
21	83	55	82	50	9
24	85	15	84	10	6
27	86	30	85	25	3
♋ 0	87	50	86	45	0 ♍

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued

Ascen.	2		3		Ascen.
	°	′	°	′	
♋ 0	87	50	86	45	30 ♎
3	89	5	88	0	27 ♍
6	89	35	89	20	24
9	88	15	89	20	21
12	87	0	88	5	18
15	85	45	86	50	15
18	84	30	85	35	12
21	83	15	84	20	9
24	82	5	83	10	6
27	81	0	82	0	3
♌ 0	79	55	80	50	0 ♐
3	78	45	79	50	27 ♏
6	77	45	78	50	24
9	76	45	77	50	21
12	75	50	76	50	18
15	75	0	76	0	15
18	74	10	75	10	12
21	73	20	74	25	9
24	72	40	73	40	6
27	72	0	73	0	3
♍ 0	71	25	72	25	0 ♑
3	70	55	71	50	27 ♐
6	70	20	71	20	24
9	69	35	70	55	21
12	69	20	70	30	18
15	69	15	70	15	15
18	68	55	69	55	12
21	68	45	69	45	9
24	68	35	69	55	6
27	68	31	69	31	3
♎	68	31	69	31	0 ♒

The

The Table of the Nonagesime Degree, for the Latitude of 60 Degrees, continued.

Cusp 10. *Sagittary* °	Nonagesime. ° ′	Cusp 10. *Capricorn* °	Nonagesime. ° ′
0	9 ♎ 1	0	0 ♑ 0
1	10 14	1	4 52
2	11 29	2	9 37
3	12 47	3	14 18
4	14 07	4	18 55
5	15 31	5	23 20
6	17 0	6	27 30
7	18 32	7	1 ♒ 26
8	20 07	8	5 10
9	21 47	9	8 43
10	23 33	10	12 05
11	25 23	11	15 17
12	27 19	12	18 13
13	29 12	13	20 58
14	1 ♏ 35	14	23 36
15	3 55	15	26 05
16	6 24	16	28 25
17	9 02	17	0 ♓ 38
18	11 47	18	2 41
19	14 43	19	4 37
20	17 55	20	6 27
21	21 17	21	8 13
22	24 50	22	9 53
23	28 34	23	11 28
24	2 ♐ 30	24	13 0
25	6 40	25	14 29
26	11 05	26	15 52
27	15 42	27	17 13
28	20 23	28	18 31
29	25 08	29	19 46
30	0 0	30	20 59

The Table *of the Nonagesime Degree, for the Latitude of 60 Degrees, continued.*

Cusp 10. *Aquarius* °	Nonagesime. ° '	Cusp 10. *Pisces.* °	Nonagesime. ° '
0	20 ♐ 59	0	16 ♈ 61
1	22 09	1	17 11
2	23 17	2	17 50
3	24 22	3	18 29
4	25 26	4	19 08
5	26 28	5	19 47
6	27 29	6	20 25
7	28 28	7	21 03
8	29 25	8	21 41
9	0 ♈ 21	9	22 18
10	1 16	10	22 55
11	2 10	11	23 31
12	3 02	12	24 08
13	3 53	13	24 44
14	4 43	14	25 20
15	5 33	15	25 56
16	6 22	16	26 32
17	7 10	17	27 07
18	7 57	18	27 43
19	8 43	19	28 18
20	9 28	20	28 54
21	10 13	21	29 29
22	10 57	22	08 04
23	11 41	23	0 ♉ 39
24	12 24	24	1 13
25	13 06	25	1 47
26	13 48	26	2 22
27	14 29	27	2 56
28	15 10	28	3 30
29	15 51	29	4 05
30	16 31	30	4 39

A

TABLE

OF THE

ANGLE ORIENT,

OR

Altitude of the Nonageſime Degree.

A Table of the Angle Orient, or Altitude of the Nonagesime Degree.

Ascen.		0		1		Ascen.	
	°	°	′	°	′	°	′
♈	0	66	31	65	31	30	0
	3	66	31	65	31	27	
	6	66	35	65	35	24	
	9	66	45	65	45	21	
	12	66	55	65	55	18	
	15	67	10	66	10	15	
	18	67	30	66	30	12	
	21	67	50	66	50	9	
	24	68	20	67	20	6	
	27	68	45	67	45	3	
♉	0	69	20	68	26	0	♓
	3	69	55	68	55	27	
	6	70	35	69	35	24	
	9	71	15	70	15	21	
	12	72	0	71	0	18	
	15	72	50	71	50	15	
	18	73	45	72	45	12	
	21	74	40	73	40	9	
	24	75	35	74	35	6	
	27	76	35	75	35	3	
♊	0	77	40	76	40	0	♒
	3	78	45	77	45	27	
	6	79	50	78	50	24	
	9	81	05	80	5	21	
	12	82	15	81	15	18	
	15	83	35	82	30	15	
	18	84	50	83	45	12	
	21	86	5	85	0	9	
	24	87	25	86	20	6	
	27	88	40	87	35	3	
♋	0	90	0	88	55	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesimo Degree, continu'd.

Ascen.		0		1		Ascen.	
°		°	′	°	′	°	
♋	0	90	0	88	55	30	♑
	3	89	55	89	45	27	
	6	87	25	88	30	24	
	9	86	05	87	10	21	
	12	84	50	85	55	18	
	15	83	35	84	40	15	
	18	82	20	83	25	12	
	21	81	05	82	10	9	
	24	80	05	81	5	6	
	27	78	50	79	55	3	
♌	0	77	35	78	45	0	♐
	3	76	35	77	40	27	
	6	75	35	76	40	24	
	9	74	40	75	45	21	
	12	73	50	74	50	18	
	15	72	55	73	55	15	
	18	72	0	73	5	12	
	21	71	15	72	20	9	
	24	70	30	71	35	6	
	27	70	0	71	0	3	
♍	0	69	25	70	25	0	♏
	3	68	45	69	50	27	
	6	68	20	69	20	24	
	9	67	55	68	55	21	
	12	67	30	68	30	18	
	15	67	05	68	10	15	
	18	66	55	67	55	12	
	21	66	45	67	45	9	
	24	66	35	67	35	6	
	27	66	31	67	31	3	
♎	0	66	31	67	31	0	♎

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.	2		3		Ascen.	
°	°	′	°	′	°	
♈ 0	64	30	63	30	30	♎
3	64	32	63	32	27	
6	64	35	63	35	24	
9	64	45	63	45	21	
12	64	55	63	55	18	
15	65	10	64	10	15	
18	65	30	64	50	12	
21	65	50	64	50	9	
24	66	15	65	25	6	
27	66	45	65	45	3	
♉ 0	67	20	66	20	0	♐
3	67	55	66	55	27	
6	68	35	67	30	24	
9	69	15	68	10	21	
12	70	00	69	10	18	
15	70	50	69	45	15	
18	71	40	70	35	12	
21	72	35	71	30	9	
24	73	35	72	30	6	
27	74	35	73	30	3	
♊ 0	75	35	74	30	0	♑
3	76	40	75	35	27	
6	77	50	76	45	24	
9	79	0	77	50	21	
12	80	10	79	03	18	
15	81	25	80	20	15	
18	82	40	81	35	12	
21	83	55	82	50	9	
24	85	15	84	10	6	
27	86	30	85	25	3	
♋ 0	87	50	86	45	0	♒

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	2		3		Ascen.
	°	′	°	′	
♑ 0	87	50	86	45	30 ♈
3	89	5	88	10	27
6	89	35	89	20	24
9	88	15	89	20	21
12	87	0	88	5	18
15	85	45	86	50	15
18	84	30	85	35	12
21	83	15	84	20	9
24	82	5	83	10	6
27	81	0	82	0	3
♒ 0	79	55	80	50	0 ♉
3	78	45	79	50	27
6	77	45	78	50	24
9	76	45	77	50	21
12	75	50	76	50	18
15	75	0	76	0	15
18	74	10	75	10	12
21	73	20	74	25	9
24	72	40	73	40	6
27	72	0	73	0	3
♓ 0	71	25	72	25	0 ♊
3	70	55	71	50	27
6	70	20	71	20	24
9	69	55	70	55	21
12	69	30	70	30	18
15	69	15	70	15	15
18	68	55	69	55	12
21	68	45	69	45	9
24	68	35	69	35	6
27	68	31	69	31	3
♈	68	31	69	31	0 ♋

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		4		5		Ascen.	
	°	°	′	°	′	°	
♈	0	62	30	61	30	30	0
	3	62	32	61	33	27	
	6	62	35	61	35	24	
	9	62	45	61	45	21	
	12	62	55	61	55	18	
	15	63	10	62	10	15	
	18	63	30	62	30	12	
	21	63	50	62	50	9	
	24	64	15	63	15	6	
	27	64	45	63	45	3	
♉	0	65	15	64	15	0	♓
	3	65	50	64	50	27	
	6	66	30	65	30	24	
	9	67	10	66	10	21	
	12	67	55	66	55	18	
	15	68	45	67	40	15	
	18	69	35	68	30	12	
	21	70	30	69	25	9	
	24	71	25	70	20	6	
	27	72	25	71	20	3	
♊	0	73	25	72	25	0	♒
	3	74	30	73	30	27	
	6	75	40	74	40	24	
	9	76	50	75	50	21	
	12	78	0	76	50	18	
	15	79	15	78	10	15	
	18	80	30	79	05	12	
	21	81	45	80	40	9	
	24	83	05	81	55	6	
	27	84	20	83	15	3	
♋	0	85	40	84	30	0	♑

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		4		5		Ascen.	
	°	°	′	°	′	°	
♋	0	85	40	84	30	0	♎
	3	86	50	85	50	27	
	6	88	15	87	10	24	
	9	89	30	88	25	21	
	12	89	10	89	45	18	
	15	87	55	89	0	15	
	18	86	40	87	45	12	
	21	85	25	86	30	9	
	24	84	15	85	20	6	
	27	83	5	84	10	3	
♌	0	82	0	83	5	0	♐
	3	80	55	82	0	27	
	6	79	50	80	55	24	
	9	78	55	79	55	21	
	12	77	55	79	0	18	
	15	77	5	78	5	15	
	18	76	15	77	15	12	
	21	75	25	76	30	9	
	24	74	45	75	45	6	
	27	74	5	75	5	3	
♍	0	73	25	74	25	0	♑
	3	72	55	73	55	27	
	6	72	25	73	25	24	
	9	71	55	72	55	21	
	12	71	35	72	35	18	
	15	71	15	72	15	15	
	18	71	0	72	0	12	
	21	70	45	71	45	9	
	24	70	35	71	55	6	
	27	70	30	71	50	3	
♎	0	70	30	71	30	0	♒

The Table *of the Angle Orient, or Altitude of the Nonageſim Degree, continued.*

Aſcen.		6		7		Aſcen.	
	°	°	′	°	′	°	
♈	0	60	30	59	30	30	0
	3	60	32	59	33	27	
	6	60	35	59	35	24	
	9	60	45	59	45	21	
	12	60	55	59	55	18	
	15	61	10	60	10	15	
	18	61	30	60	30	12	
	21	61	50	60	50	9	
	24	62	15	61	15	6	
	27	62	40	61	40	3	
♉	0	63	15	62	10	0	♓
	3	63	50	62	45	27	
	6	64	25	63	25	24	
	9	65	25	64	5	21	
	12	65	55	64	45	18	
	15	66	35	65	35	15	
	18	67	25	66	25	12	
	21	68	20	67	20	9	
	24	69	20	68	15	6	
	27	70	20	69	15	3	
♊	0	71	20	70	15	0	♒
	3	72	25	71	20	27	
	6	73	35	72	25	24	
	9	74	40	73	35	21	
	12	75	50	74	45	18	
	15	77	5	76	0	15	
	18	78	20	77	15	12	
	21	79	35	78	30	9	
	24	80	50	79	45	6	
	27	82	10	81	5	3	
♋	0	83	25	82	20	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		6 °	′	7 °	′	Ascen.	
	0					0	
♋	0	83	5	82	20	30	♍
	3	84	45	83	40	27	
	6	86	5	85	0	24	
	9	87	25	86	15	21	
	12	88	35	87	35	18	
	15	89	55	88	50	15	
	18	88	50	89	55	12	
	21	87	35	88	45	9	
	24	86	25	87	30	6	
	27	85	15	86	20	3	
♌	0	84	5	85	10	0	♎
	3	83	0	84	5	27	
	6	82	0	83	0	24	
	9	81	0	82	5	21	
	12	80	5	81	5	18	
	15	79	10	80	10	15	
	18	78	20	79	20	12	
	21	77	30	78	35	9	
	24	76	45	77	50	6	
	27	76	5	77	10	3	
♍	0	75	30	76	30	0	♏
	3	74	55	75	55	27	
	6	74	25	75	25	24	
	9	74	35	74	55	21	
	12	73	30	74	35	18	
	15	73	15	74	15	15	
	18	73	0	74	0	12	
	21	72	45	73	45	9	
	24	72	35	73	55	6	
	27	72	30	73	30	3	
♎		72	30	73	30	0	♐

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		8		9		Ascen.	
	°	°	′	°	′	°	
♈	0	58	30	57	30	30	0
	3	58	32	57	33	27	
	6	58	35	57	35	24	
	9	58	45	57	45	21	
	12	58	55	57	55	18	
	15	59	10	58	10	15	
	18	59	25	58	25	12	
	21	59	45	58	45	9	
	24	60	10	59	0	6	
	27	60	40	59	40	3	
♉	0	61	10	60	10	0	♓
	3	61	45	60	45	27	
	6	62	25	61	20	24	
	9	63	05	62	0	21	
	12	63	45	62	45	18	
	15	64	30	63	30	15	
	18	65	20	64	20	12	
	21	66	15	65	15	9	
	24	67	10	66	10	6	
	27	68	10	67	05	3	
♊	0	69	10	68	05	0	♒
	3	70	15	69	10	27	
	6	71	20	70	15	24	
	9	72	30	71	25	21	
	12	73	40	72	35	18	
	15	74	55	73	50	15	
	18	76	25	75	05	12	
	21	77	25	76	20	9	
	24	78	40	77	35	6	
	27	80	0	78	55	3	
♋	0	81	15	80	10	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.

Ascen.		8		9		Ascen.	
	°	°	′	°	′	°	
♋	0	81	15	80	10	30	♌
	3	82	35	81	30	27	
	6	83	50	82	45	24	
	9	85	10	84	5	21	
	12	86	25	85	20	18	
	15	87	45	86	40	15	
	18	89	0	87	55	12	
	21	89	45	89	10	9	
	24	88	35	89	40	6	
	27	87	25	88	25	3	
♌	0	86	15	87	20	0	♑
	3	85	10	86	15	27	
	6	84	5	85	10	24	
	9	83	5	84	10	21	
	12	82	10	83	10	18	
	15	81	15	82	15	15	
	18	80	25	81	25	12	
	21	79	35	80	35	9	
	24	78	50	79	50	6	
	27	78	10	79	5	3	
♍	0	77	30	78	30	0	♒
	3	76	55	77	55	27	
	6	76	25	77	25	24	
	9	76	0	77	0	21	
	12	75	35	76	35	18	
	15	75	15	76	15	15	
	18	75	0	76	0	12	
	21	74	45	75	45	9	
	24	74	35	75	35	6	
	27	74	30	75	30	3	
♎	0	74	30	75	30	0	♓

The

The Table of the Angle Orient, or Altitude of the Nonageſime Degree, continued.

Aſcen.		10		11		Aſcen.	
	°	°	′	°	′	°	
♈	0	56	31	55	31	30	0
	3	56	31	55	31	27	
	6	56	35	55	35	24	
	9	56	45	55	45	21	
	12	56	55	55	55	18	
	15	57	10	56	10	15	
	18	57	25	56	25	12	
	21	57	45	56	45	9	
	24	58	10	57	10	6	
	27	58	40	57	40	3	
♉	0	59	10	58	10	0	♓
	3	59	45	58	45	27	
	6	60	20	59	15	24	
	9	61	0	59	55	21	
	12	61	40	60	40	18	
	15	62	25	61	25	15	
	18	63	15	62	15	12	
	21	64	10	63	05	9	
	24	65	5	64	0	6	
	27	66	5	65	0	3	
♊	0	67	5	66	0	0	♒
	3	68	5	67	05	27	
	6	69	15	68	10	24	
	9	70	20	69	15	21	
	12	71	30	70	25	18	
	15	72	40	71	35	15	
	18	73	55	72	0	12	
	21	75	15	74	10	9	
	24	76	30	75	25	6	
	27	77	45	76	40	3	
♋	0	79	5	78	0	0	♑

A Table *of the Angle Orient, or Altitude of the Nonageſime Degree, continued.*

Aſcen.		10		11		Aſcen.	
	°	°	′	°	′	°	
♋	0	79	5	78	0	0	♌
	3	80	25	79	20	27	
	6	81	45	80	35	24	
	9	82	50	81	55	21	
	12	84	15	83	10	18	
	15	85	35	84	30	15	
	18	86	50	85	45	12	
	21	88	5	87	0	9	
	24	89	20	88	15	6	
	27	89	10	89	25	3	
♌	0	88	25	89	25	0	♍
	3	87	20	88	20	27	
	6	86	15	87	20	24	
	9	85	10	86	15	21	
	12	84	15	85	20	18	
	15	83	20	84	25	15	
	18	82	25	83	30	12	
	21	81	40	82	40	9	
	24	80	55	81	55	6	
	27	80	10	81	15	3	
♍	0	79	35	80	35	0	♎
	3	78	55	79	0	27	
	6	78	25	79	25	24	
	9	78	0	79	0	21	
	12	77	35	78	35	18	
	15	77	15	78	15	15	
	18	77	0	78	0	12	
	21	76	45	77	45	9	
	24	76	35	77	35	6	
	27	76	30	77	30	3	
♎	0	76	30	77	30	0	♏

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Aſcen.		12		13		Aſcen.	
	°	°	′	°	′	°	
♈	0	54	30	55	30	30	0
	3	54	30	53	30	27	
	6	54	35	53	35	24	
	9	54	45	53	45	21	
	12	54	55	53	55	18	
	15	55	10	54	10	15	
	18	55	25	54	25	12	
	21	55	45	54	45	9	
	24	56	10	55	10	6	
	27	56	35	55	35	3	
♉	0	57	5	56	5	0	♓
	3	57	40	56	40	27	
	6	58	15	57	15	24	
	9	58	55	57	50	21	
	12	59	35	58	35	18	
	15	60	25	59	20	15	
	18	61	10	60	10	12	
	21	62	5	61	0	9	
	24	63	0	61	55	6	
	27	63	50	62	50	3	
♊	0	64	55	63	50	0	♒
	3	66	0	64	55	27	
	6	67	5	66	0	24	
	9	68	10	67	5	21	
	12	69	20	68	15	18	
	15	70	30	69	30	15	
	18	71	45	70	40	12	
	21	73	0	71	55	9	
	24	74	20	73	15	6	
	27	75	35	74	30	3	
♋	0	76	55	75	50	0	♑

To

The Table *of the Angle Orient, or Altitude of the Nonageſime Degree, continued.*

Aſcen. °		12 ° ′	13 ° ′	Aſcen. °	
♋	0	76 55	75 50	0	♍
	3	78 10	77 5	27	
	6	79 30	78 25	24	
	9	80 50	79 45	21	
	12	82 5	81 0	18	
	15	83 25	82 15	15	
	18	84 40	83 35	12	
	21	85 55	84 50	9	
	24	87 10	86 5	6	
	27	88 20	87 15	3	
♌	0	89 30	88 25	0	♎
	3	89 25	89 25	27	
	6	86 20	89 20	24	
	9	87 20	88 20	21	
	12	86 20	87 25	18	
	15	85 25	86 30	15	
	18	84 35	85 35	12	
	21	83 40	84 45	9	
	24	83 0	84 0	6	
	27	82 15	83 15	3	
♍	0	81 35	82 35	0	♏
	3	81 0	82 0	27	
	6	80 25	81 30	24	
	9	80 0	81 0	21	
	12	79 35	80 35	18	
	15	79 15	80 15	15	
	18	79 0	80 0	12	
	21	78 45	79 45	9	
	24	78 40	79 40	6	
	27	78 31	79 31	3	
♎	0	78 31	79 31	0	♐

A Table *of the Angle Orient, or Altitude of the Nonagesim Degree.*

Aſcen.		14		15		Aſcen.	
	°	°	′	°	′	° ′	
♈	0	52	31	51	31	0	♈
	3	52	31	51	31	27	
	6	52	35	51	35	24	
	9	52	45	51	45	21	
	12	52	55	51	55	18	
	15	53	5	52	5	15	
	18	53	25	52	25	12	
	21	53	45	52	45	9	
	24	54	5	53	5	6	
	27	54	35	53	35	3	
♉	0	55	5	54	0	0	♓
	3	55	35	54	25	27	
	6	56	10	54	10	24	
	9	56	50	53	50	21	
	12	57	30	54	30	18	
	15	58	15	55	15	15	
	18	59	5	58	0	12	
	21	59	55	58	55	9	
	24	60	50	59	50	6	
	27	61	50	60	45	3	
♊	0	62	45	61	40	0	♒
	3	63	50	62	45	27	
	6	64	55	63	50	24	
	9	66	0	64	55	21	
	12	67	10	66	5	18	
	15	68	20	67	15	15	
	18	69	35	68	30	12	
	21	70	50	69	45	9	
	24	72	5	71	0	6	
	27	73	25	72	20	3	
♋	0	74	40	73	35	0	

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		14		15		Ascen.	
	°	°	′	°	′		
♋	0	74	40	73	55	0	♌
	3	76	0	74	55	27	
	6	77	20	76	15	24	
	9	78	40	77	35	21	
	12	79	55	78	50	18	
	15	81	10	80	5	15	
	18	82	30	81	25	12	
	21	83	0	82	40	9	
	24	85	0	83	55	6	
	27	86	10	85	5	3	
♌	0	87	20	86	15	0	♐
	3	88	30	87	25	27	
	6	89	35	88	30	24	
	9	89	25	89	30	21	
	12	88	25	89	30	18	
	15	87	30	88	35	15	
	18	86	40	87	40	12	
	21	85	45	86	55	9	
	24	85	0	86	5	6	
	27	84	0	85	20	3	
♍	0	83	40	84	40	0	♏
	3	83	0	84	5	27	
	6	82	30	83	20	24	
	9	82	0	83	0	21	
	12	81	35	82	40	18	
	15	81	15	82	20	15	
	18	81	0	82	0	12	
	21	80	45	81	45	9	
	24	80	40	81	40	6	
	27	80	31	81	31	3	
♎	0	80	31	81	31	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesm Degree, continued.*

Ascen.	°	16 °	16 ′	17 °	17 ′	Ascen.	°
♈	0	50	31	49	31	0	♈
	3	50	31	49	31	27	
	6	50	35	49	35	24	
	9	50	50	49	40	21	
	12	50	50	49	50	18	
	15	51	5	50	5	15	
	18	51	25	50	25	12	
	21	51	45	50	40	9	
	24	52	5	51	5	6	
	27	53	50	51	30	3	
♉	0	53	0	52	0	0	♓
	3	53	25	52	30	27	
	6	54	10	53	5	24	
	9	54	45	53	45	21	
	12	55	25	54	20	18	
	15	56	10	55	5	15	
	18	56	55	55	55	12	
	21	57	50	56	45	9	
	24	58	45	57	45	6	
	27	59	40	58	40	3	
♊	0	60	40	59	35	0	♒
	3	61	40	60	35	27	
	6	62	45	61	40	24	
	9	63	50	62	45	21	
	12	65	0	63	55	18	
	15	66	10	65	5	15	
	18	67	25	66	20	12	
	21	68	40	67	35	9	
	24	69	45	68	50	6	
	27	71	15	70	5	3	
♋	0	72	30	71	25	0	♑

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen. °		16 °	′	17 °	′	Ascen. °	
♋	0	72	30	71	25	0	♎
	3	73	0	72	45	27	
	6	75	19	74	0	24	
	9	76	25	75	20	21	
	12	77	45	76	40	18	
	15	79	0	77	50	15	
	18	80	20	79	15	12	
	21	81	35	80	30	9	
	24	82	50	81	45	6	
	27	84	0	82	50	3	
♌	0	85	10	84	10	0	♐
	3	86	20	85	15	27	
	6	87	25	86	20	24	
	9	88	30	87	25	21	
	12	89	25	88	25	18	
	15	89	40	89	20	15	
	18	88	45	89	45	12	
	21	87	50	88	50	9	
	24	87	0	88	5	6	
	27	86	20	87	25	3	
♍	0	85	40	86	45	0	♑
	3	85	5	86	5	27	
	6	84	30	85	35	24	
	9	84	5	85	5	21	
	12	83	40	84	40	18	
	15	83	20	84	20	15	
	18	83	0	84	0	12	
	21	82	45	83	45	9	
	24	82	40	83	40	6	
	27	82	31	83	31	3	
♎	0	82	31	83	31	0	♒

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		18		19		Ascen.	
	°	°	′	°	′	°	
♈	0	48	31	47	31	0	♈
	3	48	31	47	31	27	
	6	48	35	47	35	24	
	9	48	40	47	40	21	
	12	48	50	47	50	18	
	15	49	5	48	5	15	
	18	49	25	48	20	12	
	21	49	40	48	40	9	
	24	50	5	49	5	6	
	27	50	30	49	30	3	
♉	0	51	0	49	50	0	♓
	3	51	33	50	30	27	
	6	52	5	51	5	24	
	9	52	40	51	40	21	
	12	53	25	52	20	18	
	15	54	5	53	5	15	
	18	54	55	53	50	12	
	21	55	45	54	40	9	
	24	56	35	55	30	6	
	27	57	30	6	25	3	
♊	0	58	30	57	25	0	♒
	3	59	30	58	25	27	
	6	60	35	59	30	24	
	9	61	40	60	35	21	
	12	62	50	61	45	18	
	15	64	0	62	55	15	
	18	65	15	64	10	12	
	21	66	30	65	20	9	
	24	67	45	66	40	6	
	27	69	0	67	55	3	
♋	0	70	20	69	10	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		18		19		Ascen.	
	°	°	′	°	′	°	
♋	0	70	20	69	10	0	♌
	3	71	35	70	30	27	
	6	72	55	71	50	24	
	9	74	15	73	10	21	
	12	75	35	74	25	18	
	15	76	50	75	45	15	
	18	78	5	77	0	12	
	21	79	25	78	20	9	
	24	80	40	79	35	6	
	27	81	55	80	45	3	
♌	0	83	5	82	0	0	♍
	3	84	10	83	5	27	
	6	85	15	84	15	24	
	9	86	20	85	15	21	
	12	87	20	86	20	18	
	15	88	15	87	15	15	
	18	89	15	88	10	12	
	21	89	55	89	5	9	
	24	89	10	89	50	6	
	27	88	25	89	25	3	
♍	0	87	45	88	45	0	♎
	3	87	10	88	10	27	
	6	86	35	87	35	24	
	9	86	5	87	5	21	
	12	85	40	86	40	18	
	15	85	20	86	20	15	
	18	85	0	86	0	12	
	21	84	45	85	45	9	
	24	84	40	85	40	6	
	27	84	31	85	31	3	
♎	0	84	31	85	31	0	♏

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		20		21		Ascen.	
	°	°	′	°	′	°	
♈	0	46	31	45	31	0	♈
	3	46	31	45	31	27	
	6	46	35	45	35	24	
	9	46	40	45	40	21	
	12	46	50	45	50	18	
	15	47	05	46	5	15	
	18	47	20	46	20	12	
	21	47	40	46	40	9	
	24	48	5	47	0	6	
	27	48	25	47	25	3	
♉	0	48	55	47	55	0	♓
	3	49	25	48	25	27	
	6	50	0	49	0	24	
	9	50	40	49	35	21	
	12	51	15	50	15	18	
	15	52	0	0	55	15	
	18	52	45	51	40	12	
	21	53	3	52	30	9	
	24	54	30	53	25	6	
	27	55	25	54	20	3	
♊	0	56	20	55	15	0	♒
	3	57	20	56	35	27	
	6	58	25	57	20	24	
	9	59	30	58	25	21	
	12	60	40	59	35	18	
	15	61	55	60	45	15	
	18	63	0	61	50	12	
	21	64	15	63	10	9	
	24	65	30	64	25	6	
	27	66	50	6	40	3	
♋	0	68	5	67	0	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.*

Ascen.		26		21		Ascen.	
	°	°	′	°	′	°	
♋	0	68	5	67	0	0	♈
	3	69	25	68	20	27	
	6	70	45	69	40	24	
	9	72	5	70	55	21	
	12	73	20	72	15	18	
	15	74	40	73	35	15	
	18	75	55	74	50	12	
	21	77	15	76	10	9	
	24	78	30	77	25	6	
	27	79	40	78	40	3	
♌	0	80	55	79	50	0	♉
	3	82	5	81	0	27	
	6	83	5	82	5	24	
	9	84	15	83	10	21	
	12	85	15	84	10	18	
	15	86	15	85	10	15	
	18	87	10	86	5	12	
	21	88	0	87	0	9	
	24	88	50	87	45	6	
	27	89	35	88	30	3	
	0	89	45	89	10	0	♍
	3	89	10	89	50	27	
	6	88	35	89	35	24	
	9	88	5	89	5	21	
	12	87	40	88	40	18	
	15	87	20	88	20	15	
	18	87	0	88	0	12	
	21	86	45	87	45	9	
	24	86	40	87	40	6	
	27	86	31	87	31	3	
♎	0	86	31	87	31	0	♎

The Table of the Angle Orient, or Altitude of the Nonagesm Degree, continued.

Ascen. °	22 ° ′	23 ° ′	Ascen. °
♈ 0	44 31	43 31	30 ♈
3	44 31	43 31	27
6	44 35	43 35	24
9	44 40	43 40	21
12	44 50	43 50	18
15	45 5	44 5	15
18	45 20	44 20	12
21	45 40	44 40	9
24	46 0	45 0	6
27	46 25	45 25	3
♉ 0	46 50	45 50	0 ♓
3	47 25	46 25	27
6	48 0	46 55	24
9	48 35	47 30	21
12	49 10	48 10	18
15	49 55	48 50	15
18	50 40	49 35	12
21	51 30	50 25	9
24	52 20	51 20	6
27	53 15	52 10	3
♊ 0	54 10	53 5	0 ♒
3	55 10	54 5	27
6	56 15	55 10	24
9	57 20	56 15	21
12	58 25	57 20	18
15	59 35	58 30	15
18	60 50	59 45	12
21	62 5	60 55	9
24	63 20	62 15	6
27	64 35	63 30	3
♋ 0	65 55	64 45	0 ♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °		22 °	,	23 °	,	Ascen. °	
♑	0	65	55	64	45	0	♈
	3	67	10	66	5	27	
	6	68	30	67	25	24	
	9	69	50	68	45	21	
	12	71	10	70	5	18	
	15	72	30	71	10	15	
	18	73	45	72	40	12	
	21	75	5	74	0	9	
	24	76	20	75	15	6	
	27	77	35	76	30	3	
♌	0	78	45	77	40	0	♐
	3	79	0	78	50	27	
	6	81	55	80	0	24	
	9	82	5	81	5	21	
	12	83	10	82	5	18	
	15	84	5	83	5	15	
	18	85	5	84	0	12	
	21	85	55	84	55	9	
	24	86	45	85	40	6	
	27	87	30	86	25	3	
♍	0	88	30	87	10	0	♏
	3	88	50	87	45	27	
	6	89	25	88	20	24	
	9	89	55	88	50	21	
	12	89	40	89	15	18	
	15	89	20	89	40	15	
	18	89	0	89	55	12	
	21	88	45	89	45	9	
	24	88	40	89	40	6	
	27	88	31	89	31	3	
♎	0	88	31	89	31	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		23 29		24		Ascen.	
	°	°	′	°	′	°	
♈	0	43	2	42	31	0	♈
	3	43	2	42	31	27	
	6	43	5	42	35	24	
	9	43	10	42	40	21	
	12	43	20	42	50	18	
	15	43	35	43	5	15	
	18	43	50	43	20	12	
	21	44	5	43	35	9	
	24	44	25	43	55	6	
	27	44	50	44	20	3	
♉	0	45	20	45	50	0	♓
	3	45	50	45	20	27	
	6	46	25	45	50	24	
	9	47	0	46	25	21	
	12	47	35	47	5	18	
	15	48	15	47	55	15	
	18	49	5	48	30	12	
	21	49	50	49	20	9	
	24	50	45	50	15	6	
	27	51	55	51	5	3	
♊	0	52	30	52	0	0	♒
	3	53	30	53	0	27	
	6	54	35	54	5	24	
	9	55	40	55	10	21	
	12	56	50	56	15	18	
	15	58	0	57	30	15	
	18	59	10	58	40	12	
	21	60	20	59	50	9	
	24	61	35	61	5	6	
	27	62	50	62	20	3	
♋	0	64	10	63	45	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen. °		23° 29′ ° ′		24 ° ′		Ascen. °	
♋	0	64	10	63	45	0	♍
	3	65	30	65	0	27	
	6	66	50	66	20	24	
	9	68	10	67	35	21	
	12	69	30	68	55	18	
	15	70	45	70	15	15	
	18	72	5	71	35	12	
	21	73	25	72	50	9	
	24	74	40	74	10	6	
	27	75	55	75	25	3	
♌	0	77	5	76	35	0	♎
	3	78	15	77	45	27	
	6	79	20	78	50	24	
	9	80	30	80	0	21	
	12	81	33	81	0	18	
	15	82	30	82	0	15	
	18	83	30	83	0	12	
	21	84	20	83	50	9	
	24	85	10	84	40	6	
	27	85	55	85	25	3	
♍	0	86	35	86	10	0	♏
	3	87	15	86	45	27	
	6	87	55	87	20	24	
	9	88	20	87	50	21	
	12	88	45	88	15	18	
	15	89	10	88	35	15	
	18	89	25	88	55	12	
	21	89	40	89	15	9	
	24	89	50	89	20	6	
	27	89	55	89	29	3	
♎	0	90	0	89	29	0	♐

The

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Aſcen.		25		26		Aſcen.	
	°	°	′	°	′	°	
♈	0	41	31	40	31	0	♈
	3	41	31	40	31	27	
	6	41	35	40	35	24	
	9	41	40	40	40	21	
	12	41	50	40	50	18	
	15	42	5	41	5	15	
	18	42	20	41	20	12	
	21	42	35	41	35	9	
	24	42	55	41	55	6	
	27	43	20	42	20	3	
♉	0	43	50	42	45	0	♓
	3	44	20	43	15	27	
	6	44	50	43	50	24	
	9	45	25	44	25	21	
	12	46	5	45	0	18	
	15	46	45	45	40	15	
	18	47	30	46	25	12	
	21	48	20	47	15	9	
	24	49	10	48	5	6	
	27	50	0	48	55	3	
♊	0	50	55	49	50	0	♒
	3	51	55	50	50	27	
	6	53	0	51	55	24	
	9	54	5	52	55	21	
	12	55	10	54	5	18	
	15	56	20	55	15	15	
	18	57	30	56	25	12	
	21	58	45	57	35	9	
	24	60	0	58	50	6	
	27	61	15	60	10	3	
♋	0	62	35	61	25	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Aſcen.	25	26	Aſcen.
°	° ′	° ′	°
♋ 0	62 35	61 25	0 ♍
3	63 50	62 45	27
6	65 10	64 5	24
9	66 30	65 25	21
12	67 50	66 45	18
15	69 30	68 5	15
18	70 30	69 25	12
21	71 45	70 40	9
24	73 5	71 55	6
27	74 15	73 15	3
♌ 0	75 30	74 25	0 ♎
3	76 45	75 35	27
6	77 50	76 45	24
9	78 55	77 50	21
12	80 0	78 55	18
15	81 0	79 50	15
18	81 50	80 50	12
21	82 50	81 45	9
24	83 35	82 35	6
27	84 25	83 20	3
♍ 0	85 5	84 5	0 ♏
3	85 45	84 40	27
6	86 20	85 15	24
9	86 50	85 50	21
12	87 15	86 15	18
15	87 40	86 35	15
18	87 55	86 55	12
21	88 15	87 15	9
24	88 20	87 20	6
27	88 29	87 29	3
♎ 0	88 29	87 29	0 ♐

The

The Table of the Angle Orient, or Altitude of the Nonagesim Degree, continued.

Aſcen.		27 °	27 ′	28 °	28 ′	Aſcen.	
♈	0	39	31	38	31	0	♈
	3	39	31	38	31	27	
	6	39	35	38	35	24	
	9	39	40	38	40	21	
	12	39	50	38	50	18	
	15	40	5	39	5	15	
	18	40	20	39	20	12	
	21	40	35	39	35	9	
	24	40	55	39	55	6	
	27	41	20	40	15	3	
♉	0	41	45	40	45	0	♓
	3	42	15	41	10	27	
	6	42	45	41	45	24	
	9	43	20	42	20	21	
	12	43	55	42	55	18	
	15	44	35	43	35	15	
	18	45	20	44	15	12	
	21	46	10	45	5	9	
	24	47	15	45	50	6	
	27	47	45	26	40	3	
♊	0	48	50	47	40	0	♒
	3	49	55	48	40	27	
	6	51	0	49	40	24	
	9	52	0	50	45	21	
	12	53	0	51	50	18	
	15	54	0	53	0	15	
	18	55	15	54	10	12	
	21	56	30	55	25	9	
	24	57	55	56	35	6	
	27	59	0	57	55	3	
♋	0	60	20	59	10	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °		27 ° ′	28 ° ′	Ascen. °	
♋	0	60 20	59 10	0	♎
	3	61 40	60 30	27	
	6	63 0	61 50	24	
	9	64 15	63 10	21	
	12	65 35	64 30	18	
	15	66 55	65 50	15	
	18	68 15	67 10	12	
	21	69 50	68 30	9	
	24	70 35	69 45	6	
	27	72 10	71 0	3	
♌	0	73 20	72 15	0	♐
	3	74 30	73 25	27	
	6	75 40	74 35	24	
	9	76 50	75 45	21	
	12	77 50	76 45	18	
	15	78 50	77 50	15	
	18	79 50	78 40	12	
	21	80 45	79 45	9	
	24	81 35	80 30	6	
	27	82 20	81 20	3	
♍	0	83 5	82 0	0	♑
	3	83 40	82 40	27	
	6	84 15	83 15	24	
	9	84 50	83 50	21	
	12	85 15	84 15	18	
	15	85 35	84 35	15	
	18	85 55	84 55	12	
	21	86 15	85 15	9	
	24	86 20	85 20	6	
	27	86 29	85 29	3	
♎	0	86 29	85 29	0	♒

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		29		30		Ascen.	
	°	°	′	°	′	° ′	
♈	0	37	31	36	31	0	♈
	3	37	31	36	31	27	
	6	37	35	36	35	24	
	9	37	40	36	40	21	
	12	37	50	36	50	18	
	15	38	0	37	0	15	
	18	38	15	37	15	12	
	21	38	35	37	35	9	
	24	38	55	37	50	6	
	27	39	15	38	15	3	
♉	0	39	40	38	40	0	♓
	3	40	10	39	10	27	
	6	40	40	39	40	24	
	9	41	15	40	15	21	
	12	41	55	40	50	18	
	15	42	30	41	30	15	
	18	43	15	42	10	12	
	21	44	0	42	55	9	
	24	44	50	43	45	6	
	27	45	40	44	35	3	
♊	0	46	35	45	30	0	♒
	3	47	35	46	30	27	
	6	48	35	47	30	24	
	9	49	40	48	30	21	
	12	50	45	49	40	18	
	15	51	50	50	45	15	
	18	53	5	51	55	12	
	21	54	15	53	10	9	
	24	55	30	54	25	6	
	27	56	45	55	40	3	
♋	0	58	5	57	0	0	♑

The Table of the Angle Orient, or Altitude of the Nonageſime Degree, continued.

Aſcen.		29		30		Aſcen.	
♋	0	58	5	57	0	6	♍
	3	59	25	58	15	27	
	6	60	45	59	35	24	
	9	62	5	60	55	21	
	12	63	25	62	15	18	
	15	64	45	63	35	15	
	18	66	5	64	55	12	
	21	67	20	66	15	9	
	24	68	40	67	35	6	
	27	69	55	68	50	3	
♌	0	70	10	70	5	0	♐
	3	72	20	71	15	27	
	6	73	30	72	30	24	
	9	74	40	73	35	21	
	12	75	45	74	40	18	
	15	76	45	75	40	15	
	18	77	45	76	40	12	
	21	78	40	77	35	9	
	24	79	30	78	25	6	
	27	80	15	79	15	3	
♍	0	81	0	80	0	0	♑
	3	81	40	80	40	27	
	6	82	15	81	15	24	
	9	82	45	81	45	21	
	12	83	15	82	15	18	
	15	83	45	82	40	15	
	18	83	55	82	55	12	
	21	84	5	83	10	9	
	24	84	20	83	20	6	
	27	84	29	83	29	3	
♎	0	84	29	83	29	0	♒

The Table *of the* Angle Orient, *or* Altitude *of the Nonagesime Degree, continued.*

Aſcen.		31		32		Aſcen.	
	°	°	′	°	′	°	
♈	0	35	31	34	31	0	♈
	3	35	31	34	31	27	
	6	35	35	34	35	24	
	9	35	40	34	40	21	
	12	35	50	34	50	18	
	15	36	0	35	0	15	
	18	36	15	35	15	12	
	21	36	35	35	30	9	
	24	36	50	35	50	6	
	27	37	15	36	10	3	
♉	0	37	40	36	35	0	♓
	3	38	5	37	5	27	
	6	38	35	37	55	24	
	9	39	10	38	10	21	
	12	39	45	38	45	18	
	15	40	25	39	25	15	
	18	41	10	40	5	12	
	21	41	50	40	45	9	
	24	42	40	41	35	6	
	27	43	30	42	25	3	
♊	0	44	20	43	20	0	♒
	3	45	25	44	15	27	
	6	46	20	45	15	24	
	9	47	25	46	20	21	
	12	48	30	47	25	18	
	15	49	40	48	30	15	
	18	50	0	49	40	12	
	21	52	50	50	55	9	
	24	53	15	52	10	6	
	27	54	30	53	25	3	
♋	0	55	50	54	40	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen. °		31 °	′	32 °	′	Ascen. °	
♋	0	55	50	54	40	0	♍
	3	57	10	56	0	27	
	6	58	30	57	20	24	
	9	59	50	58	40	21	
	12	61	10	60	5	18	
	15	62	30	61	20	15	
	18	63	50	62	40	12	
	21	65	10	64	5	9	
	24	66	25	65	20	6	
	27	67	45	66	40	3	
♌	0	69	0	67	55	0	♎
	3	70	10	69	5	27	
	6	71	25	70	20	24	
	9	72	30	71	25	21	
	12	73	35	72	30	18	
	15	74	35	73	35	15	
	18	75	35	74	40	12	
	21	76	30	75	30	9	
	24	77	25	76	20	6	
	27	78	10	77	10	3	
♍	0	78	55	77	55	0	♏
	3	79	35	78	35	27	
	6	80	15	79	10	24	
	9	80	45	79	45	21	
	12	81	15	80	15	18	
	15	81	35	80	35	15	
	18	81	55	80	55	12	
	21	82	10	81	10	9	
	24	82	20	81	20	6	
	27	82	29	81	29	3	
♎	0	82	29	81	29	0	♐

The

The Table of the Angle Orient, or Altitude of the Nonagesin Degree, continued.

Ascen.		33		34		Ascen.	
	°	°	′	°	′	°	
♈	0	33	31	32	31	0	♈
	3	33	31	32	31	27	
	6	33	35	32	35	24	
	9	33	40	32	40	21	
	12	33	50	32	50	18	
	15	34	0	33	0	15	
	18	34	15	33	15	12	
	21	34	30	33	31	9	
	24	34	50	33	50	6	
	27	35	10	34	10	3	
♉	0	35	35	34	35	0	♓
	3	36	0	35	0	27	
	6	36	30	35	30	24	
	9	37	5	36	0	21	
	12	37	40	36	35	18	
	15	38	20	37	15	15	
	18	39	0	37	55	12	
	21	39	45	38	40	9	
	24	40	30	39	25	6	
	27	41	20	40	15	3	
♊	0	42	15	41	10	0	♒
	3	43	10	42	5	27	
	6	44	10	43	5	24	
	9	45	15	44	5	21	
	12	46	25	45	10	18	
	15	47	25	46	15	15	
	18	48	35	47	25	12	
	21	49	40	48	35	9	
	24	51	0	49	50	6	
	27	52	15	51	5	3	
♋	0	53	35	52	25	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		33		34		Ascen.	
	°	°	′	°	′	°	
♋	0	53	35	52	25	0	♎
	3	54	30	53	45	27	
	6	56	10	55	5	24	
	9	57	35	56	25	21	
	12	58	55	57	45	18	
	15	60	15	59	5	15	
	18	61	35	60	30	12	
	21	62	55	61	50	9	
	24	64	15	63	5	6	
	27	65	30	64	25	3	
♌	0	66	50	65	40	0	♐
	3	68	0	66	55	27	
	6	69	15	68	10	24	
	9	70	25	69	20	21	
	12	71	30	70	25	18	
	15	72	30	71	25	15	
	18	73	30	72	25	12	
	21	74	25	73	25	9	
	24	75	20	74	15	6	
	27	76	10	75	5	3	
♍	0	76	55	75	50	0	♏
	3	77	35	76	35	27	
	6	78	10	77	10	24	
	9	78	45	77	40	21	
	12	79	10	78	10	18	
	15	79	35	78	35	15	
	18	79	55	78	55	12	
	21	80	10	79	10	9	
	24	80	20	79	20	6	
	27	80	29	79	29	3	
♎	0	80	29	79	29	0	♑

The Table of the Angle Orient, or Altitude of the Nonagefimal Degree, continued.

Aſcen.		35		36		Aſcen.	
	°	°	′	°	′	°	
♈	0	31	31	30	31	0	♈
	3	31	31	30	31	27	
	6	31	35	30	35	24	
	9	31	40	30	40	21	
	12	31	50	30	50	18	
	15	32	0	31	0	15	
	18	32	15	31	10	12	
	21	32	30	31	30	9	
	24	32	45	31	45	6	
	27	33	30	32	5	3	
♉	0	33	50	32	30	0	♓
	3	34	0	32	55	27	
	6	34	25	33	25	24	
	9	35	0	33	55	21	
	12	35	35	34	30	18	
	15	36	20	35	5	15	
	18	36	50	35	45	12	
	21	37	35	36	30	9	
	24	38	20	37	15	6	
	27	39	30	38	5	3	
♊	0	40	0	38	55	0	♒
	3	41	0	39	50	27	
	6	41	55	40	50	24	
	9	43	0	41	60	21	
	12	44	0	42	50	18	
	15	45	5	44	0	15	
	18	46	15	45	10	12	
	21	47	30	46	20	9	
	24	48	45	47	35	6	
	27	50	0	48	30	3	
♋	0	51	15	49	10	0	♑

The Table of the Angle Orient, or Altitude of the Nonageſime Degree, continu'd.

Aſcen.		35 °	35 ′	36 °	36 ′	Aſcen.	
	0					0	
♑	0	51	15	50	10	0	♒
	3	52	15	51	25	27	
	6	53	55	52	45	24	
	9	55	15	54	10	21	
	12	56	40	55	30	18	
	15	58	0	56	50	15	
	18	59	20	58	15	12	
	21	60	40	59	35	9	
	24	62	0	60	55	6	
	27	63	20	62	10	3	
♌	0	64	35	63	30	0	♐
	3	65	50	64	45	27	
	6	67	5	66	0	24	
	9	68	15	67	10	21	
	12	69	20	68	15	18	
	15	70	20	69	20	15	
	18	71	25	70	20	12	
	21	72	20	71	20	9	
	24	73	15	72	10	6	
	27	74	5	73	0	3	
♍	0	74	50	73	45	0	♏
	3	75	30	74	30	27	
	6	76	10	75	10	24	
	9	76	40	75	40	21	
	12	77	10	76	10	18	
	15	77	35	76	35	15	
	18	77	55	76	55	12	
	21	78	10	77	10	9	
	24	78	20	77	20	6	
	27	78	29	77	29	3	
♎	0	78	29	77	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesm Degree, continued.*

Ascen.		37		38½		Ascen.	
	°	°	′	°	′	°	
♈	0	29	31	28	31	0	♈
	3	29	31	28	31	27	
	6	29	35	28	35	24	
	9	29	40	28	40	21	
	12	29	50	28	45	18	
	15	30	0	29	0	15	
	18	30	10	29	10	12	
	21	30	25	29	25	9	
	24	30	45	29	45	6	
	27	31	5	30	0	3	
♉	0	31	25	30	25	0	♓
	3	31	50	30	50	27	
	6	32	20	31	20	24	
	9	32	55	31	50	21	
	12	33	25	32	20	18	
	15	34	0	32	55	15	
	18	34	40	33	35	12	
	21	35	25	34	20	9	
	24	36	10	35	5	6	
	27	37	0	35	50	3	
♊	0	37	50	36	40	0	♒
	3	38	45	37	40	27	
	6	39	40	38	35	24	
	9	40	45	39	35	21	
	12	41	45	40	35	18	
	15	42	50	41	40	15	
	18	44	0	42	50	12	
	21	45	10	44	0	9	
	24	46	25	45	15	6	
	27	47	40	46	30	3	
♋	0	49	0	47	50	0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		37		38		Ascen.	
°		°	′	°	′	°	
♋	0	49	0	47	50	0	♑
	3	50	15	49	10	27	
	6	51	40	50	30	24	
	9	53	20	51	50	21	
	12	54	20	53	10	18	
	15	55	20	54	35	15	
	18	57	5	55	55	12	
	21	58	20	56	20	9	
	24	59	20	58	40	6	
	27	61	5	60	0	3	
♌	0	62	25	61	15	0	♐
	3	63	40	62	30	27	
	6	64	55	63	45	24	
	9	66	5	65	0	21	
	12	67	10	66	5	18	
	15	68	35	67	10	15	
	18	69	35	68	10	12	
	21	70	35	69	10	9	
	24	71	10	70	5	6	
	27	72	0	70	55	3	
♍	0	72	45	71	45	0	♏
	3	73	30	72	25	27	
	6	74	5	73	5	24	
	9	74	40	73	40	21	
	12	75	10	74	10	18	
	15	75	35	74	35	15	
	18	75	55	74	55	12	
	21	76	10	75	10	9	
	24	76	20	75	20	6	
	27	76	29	75	29	3	
♎	0	76	29	75	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.	39		40		Ascen.	
♈ 0	27	31	26	31	0	♈
3	27	31	26	31	27	
6	27	35	26	35	24	
9	27	40	26	40	21	
12	27	45	26	45	18	
15	28	0	26	55	15	
18	28	10	27	10	12	
21	28	25	27	25	9	
24	28	40	27	40	6	
27	29	0	28	0	3	
♉ 0	29	25	28	20	0	♓
3	29	50	28	45	27	
6	30	25	29	15	24	
9	30	45	29	40	21	
12	31	20	30	15	18	
15	31	55	30	55	15	
18	32	35	31	30	12	
21	32	15	32	10	9	
24	33	55	32	50	6	
27	34	45	33	40	3	
♊ 0	35	35	34	30	0	♒
3	36	30	35	25	27	
6	37	25	36	20	24	
9	38	25	37	20	21	
12	39	10	38	20	18	
15	40	35	39	25	15	
18	41	40	40	30	12	
21	42	55	41	45	9	
24	44	5	42	55	6	
27	45	20	44	10	3	
♋ 0	46	40	45	30	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Aſcen. °		39° °	'	40° °	'	Aſcen. °	
♋	0	46	40	45	30	0	♈
	3	48	0	46	50	27	
	6	49	0	48	10	24	
	9	50	40	49	30	21	
	12	52	5	50	35	18	
	15	53	25	52	15	15	
	18	54	45	53	40	12	
	21	56	10	55	0	9	
	24	57	30	56	25	6	
	27	58	50	57	45	3	
♌	0	60	10	59	0	0	♉
	3	61	25	60	20	27	
	6	62	40	61	35	24	
	9	63	55	62	50	21	
	12	65	0	63	50	18	
	15	66	5	65	0	15	
	18	67	10	66	5	12	
	21	68	10	67	5	9	
	24	69	5	68	0	6	
	27	69	55	68	50	3	
♍	0	70	40	69	40	0	♊
	3	71	25	70	25	27	
	6	72	5	71	0	24	
	9	72	35	71	35	21	
	12	73	5	72	5	18	
	15	73	35	72	30	15	
	18	73	55	72	55	12	
	21	74	10	73	10	9	
	24	74	20	73	20	6	
	27	74	29	73	29	3	
♎	0	74	29	73	29	0	♋

The

The Table *of the Angle Orient, or Altitude of the Nonageſime Degree, continued.*

Aſcen.		41		42		Aſcen.	
	°	°	′	°	′	°	
♈	0	25	31	24	31	0	♈
	3	25	31	24	31	27	
	6	25	35	24	35	24	
	9	25	40	24	40	21	
	12	25	45	24	45	18	
	15	25	55	24	55	15	
	18	26	10	25	5	12	
	21	26	25	25	20	9	
	24	26	40	25	35	6	
	27	26	55	25	55	3	
♉	0	27	20	26	15	0	♓
	3	27	45	26	40	27	
	6	28	10	27	5	24	
	9	28	40	27	35	21	
	12	29	10	28	5	18	
	15	29	45	28	40	15	
	18	30	20	29	15	12	
	21	31	0	29	55	9	
	24	31	45	30	40	6	
	27	32	10	31	25	3	
♊	0	33	20	32	15	0	♒
	3	34	15	33	5	27	
	6	35	10	34	0	24	
	9	36	10	35	0	21	
	12	37	10	36	0	18	
	15	38	15	37	5	15	
	18	39	20	38	15	12	
	21	40	35	39	20	9	
	24	41	45	40	35	6	
	27	43	0	41	50	3	
♋	0	44	20	43	10	0	♑

The

The Table *of the* Angle Orient, *or* Altitude *of the Nonagesime Degree, continued.*

Ascen.		41 ° '		42 ° '		Ascen.	
♋	0	44	20	43	20	0	♎
	3	45	40	44	25	27	
	6	47	0	45	50	24	
	9	48	20	47	10	21	
	12	49	45	48	35	18	
	15	51	5	49	55	15	
	18	52	30	51	20	12	
	21	53	0	52	45	9	
	24	55	15	54	5	6	
	27	56	35	55	25	3	
♌	0	57	50	56	50	0	♐
	3	59	10	58	5	27	
	6	60	30	59	25	24	
	9	61	40	60	35	21	
	12	62	50	61	45	18	
	15	63	55	62	50	15	
	18	65	0	63	55	12	
	21	66	0	64	50	9	
	24	66	55	65	55	6	
	27	67	50	66	45	3	
♍	0	68	35	67	35	0	♑
	3	69	20	68	20	27	
	6	70	0	69	0	24	
	9	70	35	69	35	21	
	12	71	5	70	5	18	
	15	71	30	70	30	15	
	18	71	35	70	55	12	
	21	72	10	71	10	9	
	24	72	20	71	20	6	
	27	72	29	71	29	3	
♎	0	72	29	71	29	0	♒

The

The Table of the Angle Orient, or Altitude of the Nonagesimal Degree, continued.

Ascen.		43		44		Ascen.	
	°	°	′	°	′	°	
♈	0	23	31	22	31	0	♈
	3	23	31	22	31	27	
	6	23	35	22	35	24	
	9	23	40	22	40	21	
	12	23	45	22	45	18	
	15	23	55	22	55	15	
	18	24	5	23	5	12	
	21	24	20	23	20	9	
	24	24	35	23	35	6	
	27	24	50	23	50	3	
♉	0	25	15	24	10	0	♓
	3	25	40	24	35	27	
	6	26	5	25	0	24	
	9	26	30	25	25	21	
	12	27	0	25	50	18	
	15	27	35	26	30	15	
	18	28	10	27	5	12	
	21	28	50	27	45	9	
	24	29	30	28	25	6	
	27	30	20	29	10	3	
♊	0	31	5	30	0	0	♒
	3	32	0	30	50	27	
	6	32	55	31	45	24	
	9	33	50	32	40	21	
	12	34	50	33	40	18	
	15	35	50	34	45	15	
	18	37	0	35	50	12	
	21	38	10	37	0	9	
	24	39	25	38	15	6	
	27	40	40	39	30	3	
♋	0	41	55	40	45	0	♑

The Table *of the Angle Orient, or Altitude of the Nonageſime Degree, continued.*

Aſcen.	43 °	43 ′	44 °	44 ′	Aſcen.	
♋ 0	41	55	40	45	0	♎
3	43	15	42	5	27	
6	44	35	43	25	24	
9	46	0	44	50	21	
12	47	25	46	10	18	
15	48	45	47	35	15	
18	50	10	49	0	12	
21	51	5	50	25	9	
24	52	50	51	45	6	
27	54	20	53	10	3	
♌ 0	55	40	54	30	0	♐
3	57	0	55	50	27	
6	58	15	57	10	24	
9	59	30	58	25	21	
12	60	40	59	35	18	
15	61	50	60	40	15	
18	62	50	61	45	12	
21	63	55	62	50	9	
24	64	50	63	45	6	
27	65	45	64	40	3	
♍ 0	66	35	65	30	0	♑
3	67	15	66	15	27	
6	67	55	66	55	24	
9	68	30	67	30	21	
12	69	5	68	5	18	
15	69	30	68	30	15	
18	69	55	68	50	12	
21	70	10	69	10	9	
24	70	20	69	20	6	
27	70	29	69	29	3	
♎ 0	70	29	69	29	0	♒

The Table of the Angle Orient, or Altitude of the Nonagesim Degree, continued.

Ascen.		45°		46°		Ascen.	
	°	°	′	°	′	°	
♈	0	21	31	20	31	0	♈
	3	21	31	20	31	27	
	6	21	35	20	35	24	
	9	21	40	20	40	21	
	12	21	45	20	45	18	
	15	21	50	20	50	15	
	18	22	5	21	5	12	
	21	22	20	21	20	9	
	24	22	30	21	30	6	
	27	22	50	21	50	3	
♉	0	23	10	22	5	0	♓
	3	23	30	22	30	27	
	6	23	55	22	50	24	
	9	24	25	23	20	21	
	12	24	55	23	50	18	
	15	25	25	24	20	15	
	18	25	0	24	55	12	
	21	26	35	25	30	9	
	24	27	20	26	10	6	
	27	28	0	26	55	3	
♊	0	28	50	27	40	0	♒
	3	29	40	28	30	27	
	6	30	35	29	25	24	
	9	31	30	30	20	21	
	12	32	30	31	20	18	
	15	33	35	32	20	15	
	18	34	40	33	25	12	
	21	35	45	34	35	9	
	24	37	0	35	45	6	
	27	38	15	37	0	3	
♋	0	39	30	38	20	0	♑

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Aſcen.	45		46		Aſcen.	
°	°	′	°	′	°	
♋ 0	39	30	38	20	0	♎
3	40	30	39	40	27	
6	42	10	41	0	24	
9	43	35	42	20	21	
12	45	0	43	50	18	
15	46	25	44	10	15	
18	47	50	46	35	12	
21	49	15	48	0	9	
24	50	35	49	25	6	
27	52	0	50	50	3	
♌ 0	53	25	52	15	0	♏
3	54	45	53	35	27	
6	56	0	54	55	24	
9	57	15	56	10	21	
12	58	30	57	20	18	
15	59	40	58	30	15	
18	60	45	59	40	12	
21	61	45	60	40	9	
24	62	45	61	40	6	
27	63	40	62	35	3	
♍ 0	64	30	63	25	0	♐
3	65	15	64	10	27	
6	65	55	64	55	24	
9	66	30	65	30	21	
12	67	0	66	0	18	
15	67	30	66	30	15	
18	67	50	66	50	12	
21	68	10	67	10	9	
24	68	20	67	20	6	
27	68	29	67	29	3	
♎ 0	68	29	67	29	0	♑

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		47		48		Ascen.	
	8	°	′	°	′	°	′
♈	0	19	31	18	31	0	♈
	3	19	31	18	31	27	
	6	19	35	18	35	24	
	9	19	40	18	40	21	
	12	19	45	18	45	18	
	15	19	50	18	50	15	
	18	20	0	19	0	12	
	21	20	15	19	15	9	
	24	20	30	19	25	6	
	27	20	45	19	45	3	
♉	0	21	5	20	0	0	♓
	3	21	25	20	20	27	
	6	21	50	20	45	24	
	9	22	15	21	10	21	
	12	22	45	21	35	18	
	15	23	15	22	10	15	
	18	23	45	22	40	12	
	21	24	25	23	15	9	
	24	25	0	23	55	6	
	27	25	45	24	35	3	
♊	0	26	10	25	20	0	♒
	3	27	20	26	10	27	
	6	28	15	27	0	24	
	9	29	30	27	55	21	
	12	30	5	28	55	18	
	15	31	10	29	55	15	
	18	32	15	31	0	12	
	21	33	20	32	10	9	
	24	34	35	33	20	6	
	27	35	50	34	35	3	
♋	0	37	5	35	55	0	♑

The Table *of the Angle Orient, or Altitude of the Nonageſime Degree, continued.*

Aſcen. °	47 °	47 ′	48 °	48 ′	Aſcen. °	
♋ 0	37	5	35	55	0	♈
3	38	25	37	10	27	
6	39	45	38	30	24	
9	41	10	39	55	21	
12	42	35	41	20	18	
15	44	0	42	45	15	
18	45	25	44	15	12	
21	46	50	45	40	9	
24	48	15	47	5	6	
27	49	40	48	30	3	
♌ 0	51	5	49	55	0	♓
3	52	25	51	15	27	
6	53	45	52	40	24	
9	55	5	53	55	21	
12	56	15	55	5	18	
15	57	25	56	20	15	
18	58	40	57	25	12	
21	59	25	58	10	9	
24	60	35	59	35	6	
27	61	30	60	30	3	
♍ 0	62	20	61	20	0	♒
3	63	10	62	5	27	
6	63	50	62	50	24	
9	64	30	63	25	21	
12	65	0	64	0	18	
15	65	30	64	25	15	
18	65	50	64	50	12	
21	66	10	65	10	9	
24	66	20	65	20	6	
27	66	29	65	29	3	
♎ 0	66	29	65	29	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesm Degree, continued.

Ascen.		49		50		Ascen.	
	°	°	′	°	′	°	
♈	0	17	31	16	31	0	♈
	3	17	31	16	31	27	
	6	17	35	16	35	24	
	9	17	40	16	40	21	
	12	17	45	16	45	18	
	15	17	50	16	50	15	
	18	18	0	17	0	12	
	21	18	10	17	10	9	
	24	18	25	17	25	6	
	27	18	40	17	40	3	
♉	0	19	0	18	0	0	♓
	3	19	20	18	15	27	
	6	19	40	18	35	24	
	9	20	5	19	0	21	
	12	20	50	19	25	18	
	15	21	0	19	50	15	
	18	21	30	20	25	12	
	21	22	5	21	0	9	
	24	22	45	21	35	6	
	27	23	25	22	15	3	
♊	0	24	10	23	0	0	♒
	3	25	0	23	45	27	
	6	25	50	24	35	24	
	9	26	45	25	30	21	
	12	27	45	26	25	18	
	15	28	40	27	25	15	
	18	29	45	28	30	12	
	21	30	55	29	35	9	
	24	32	5	30	50	6	
	27	33	20	32	5	3	
♋	0	34	35	33	20	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		49		50		Ascen.	
	°	°	′	°	′	°	
♋	0	34	35	33	20	0	♑
	3	35	55	34	40	27	
	6	37	15	36	0	24	
	9	38	40	37	25	21	
	12	40	10	38	50	18	
	15	41	35	40	20	15	
	18	43	0	41	45	12	
	21	44	25	43	15	9	
	24	45	55	44	20	6	
	27	47	20	46	5	3	
♌	0	48	45	47	35	0	♐
	3	50	10	48	55	27	
	6	51	30	50	20	24	
	9	52	45	51	40	21	
	12	54	0	52	55	18	
	15	55	10	54	5	15	
	18	56	20	55	15	12	
	21	57	25	56	20	9	
	24	58	30	57	25	6	
	27	59	25	58	20	3	
♍	0	60	15	59	15	0	♏
	3	61	5	60	0	27	
	6	61	45	60	45	24	
	9	62	25	61	25	21	
	12	63	0	61	55	18	
	15	63	25	62	25	15	
	18	63	55	62	50	12	
	21	64	10	63	10	9	
	24	64	20	63	20	6	
	27	64	29	63	29	3	
♎	0	64	29	63	29	0	♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		51		52		Ascen.	
	o	o	'	o	'	o	
♈	0	15	31	14	31	0	♈
	3	15	31	14	31	27	
	6	15	35	14	31	24	
	9	15	40	14	35	21	
	12	15	45	14	40	18	
	15	15	50	14	45	15	
	18	16	0	14	55	12	
	21	16	10	15	10	9	
	24	16	20	15	20	6	
	27	16	35	15	30	3	
♉	0	16	50	15	50	0	♓
	3	17	15	16	10	27	
	6	17	10	16	25	24	
	9	17	55	16	50	21	
	12	18	20	17	15	18	
	15	18	45	17	40	15	
	18	19	15	18	10	12	
	21	19	50	18	40	9	
	24	20	25	19	15	6	
	27	21	5	19	55	3	
♊	0	21	50	20	35	0	♒
	3	22	35	21	20	27	
	6	23	25	22	10	24	
	9	24	15	23	0	21	
	12	25	10	23	55	18	
	15	26	10	24	55	15	
	18	27	15	25	55	12	
	21	28	20	27	5	9	
	24	29	30	28	15	6	
	27	30	45	29	30	3	
♋	0	32	5	30	45	0	♑

The Table of the Angle Orient, or *Altitued. of the Nonageſime Degree, continued.*

Aſcen.		51 ° ′		52 ° ′		Aſceu °	
♋	0	32	5	30	45	0	♌
	3	33	20	32	5	27	
	6	34	45	33	25	24	
	9	36	10	34	50	21	
	12	37	35	36	20	18	
	15	39	5	37	45	15	
	18	40	30	39	15	12	
	21	42	0	40	45	9	
	24	43	25	42	15	6	
	27	44	50	43	40	3	
♌	0	46	20	45	10	0	♍
	3	47	45	46	35	27	
	6	49	10	48	0	24	
	9	50	10	49	20	21	
	12	51	45	50	35	18	
	15	53	0	51	50	15	
	18	54	10	53	5	12	
	21	55	15	54	10	9	
	24	56	20	55	15	6	
	27	57	15	56	15	3	
♍	0	58	10	57	5	0	♎
	3	59	0	57	55	27	
	6	59	45	58	40	24	
	9	60	20	59	20	21	
	12	60	55	59	55	18	
	15	61	25	60	25	15	
	18	62	30	60	50	12	
	21	62	10	61	5	9	
	24	62	20	61	20	6	
	27	62	29	61	29	3	
♎	0	62	29	61	29	0	♏

The } Table *of the Angle Orient, or Altitude of the Nonagesm Degree, continued.*

Ascen.		53		54		Ascen.	
	°	°	′	°	′	°	
♈	0	13	31	12	31	0	♈
	3	13	31	12	31	27	
	6	13	31	12	31	24	
	9	13	35	12	35	21	
	12	13	40	12	40	18	
	15	13	55	12	45	15	
	18	13	55	12	55	12	
	21	14	5	13	5	9	
	24	14	15	13	15	6	
	27	14	30	13	30	3	
♉	0	14	45	13	40	0	♓
	3	15	5	14	0	27	
	6	15	20	14	15	24	
	9	15	45	14	35	21	
	12	16	10	15	0	18	
	15	16	35	15	25	15	
	18	17	0	15	50	12	
	21	17	30	16	20	9	
	24	18	5	16	55	6	
	27	18	45	17	30	3	
♊	0	19	25	18	10	0	
	3	20	5	18	55	27	
	6	20	50	19	40	24	
	9	21	45	20	30	21	
	12	22	40	21	20	18	
	15	23	35	22	20	15	
	18	24	40	23	20	12	
	21	25	45	24	25	9	
	24	26	55	25	35	6	
	27	28	10	26	50	3	
♋	0	29	25	28	5	0	♍

The Table *of the Angle Orient, or Altitude of the Nonageſime Degree, continu'd.*

Aſcen.	53		54		Aſcen.	
°	°	′	°	′	°	
♋ 0	29	25	28	5	0	♒
3	30	45	29	25	27	
6	32	10	30	45	24	
9	33	35	32	10	21	
12	35	0	33	40	18	
15	36	30	35	10	15	
18	38	0	36	40	12	
21	39	30	38	10	9	
24	41	0	39	40	6	
27	42	25	41	15	3	
♌ 0	43	55	42	45	0	♐
3	45	25	44	10	27	
6	46	50	45	35	24	
9	48	10	47	0	21	
12	49	30	48	20	18	
15	50	45	49	35	15	
18	52	0	50	50	12	
21	53	5	52	0	9	
24	54	10	53	5	6	
27	55	10	54	5	3	
♍ 0	56	4	55	0	0	♏
3	56	55	55	50	27	
6	57	40	56	35	24	
9	58	20	57	15	21	
12	58	55	57	55	18	
15	59	25	58	20	15	
18	59	50	58	45	12	
21	60	5	59	5	9	
24	60	20	59	20	6	
27	60	29	59	29	3	
♎ 0	60	29	59	29	0	♎

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.	°	55 °	55 ′	56 °	56 ′	Ascen.	°
♈	0	11	31	10	31	0	♈
	3	11	31	10	31	27	
	6	11	31	10	31	24	
	9	11	35	10	35	21	
	12	11	40	10	40	18	
	15	11	45	10	45	15	
	18	11	55	10	50	12	
	21	12	0	11	0	9	
	24	12	10	11	10	6	
	27	12	25	11	20	3	
♉	0	12	40	11	35	0	♓
	3	12	55	11	50	27	
	6	13	10	12	5	24	
	9	13	30	12	20	21	
	12	13	50	12	40	18	
	15	14	15	13	5	15	
	18	14	40	13	30	12	
	21	15	10	14	0	9	
	24	15	46	14	30	6	
	27	16	20	15	5	3	
♊	0	16	55	15	40	0	♒
	3	16	35	16	20	27	
	6	18	20	17	5	24	
	9	19	10	17	50	21	
	12	20	0	18	40	18	
	15	21	0	19	35	15	
	18	21	55	20	35	12	
	21	23	0	21	40	9	
	24	24	10	22	50	6	
	27	25	25	24	5	3	
♋	0	26	40	25	15	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °		55 °	′	56 °	′	Ascen. °	
♋	0	26	40	25	15	0	♌
	3	28	0	26	40	27	
	6	29	25	28	5	24	
	9	30	50	29	30	21	
	12	32	15	30	55	18	
	15	33	50	32	30	15	
	18	35	20	34	0	12	
	21	36	50	35	35	9	
	24	38	25	33	5	6	
	27	40	0	38	40	3	
♌	0	41	30	40	15	0	♍
	3	42	54	41	40	27	
	6	44	25	43	10	24	
	9	45	55	44	35	21	
	12	47	30	46	0	18	
	15	48	25	47	20	15	
	18	49	40	48	35	12	
	21	50	55	49	40	9	
	24	52	0	50	50	6	
	27	53	0	51	55	3	
♍	0	53	55	52	50	0	♎
	3	54	45	53	45	27	
	6	55	35	54	30	24	
	9	56	15	55	15	21	
	12	56	55	55	50	18	
	15	57	20	56	20	15	
	18	57	45	56	45	12	
	21	58	5	57	5	9	
	24	58	20	57	20	6	
	27	58	29	57	29	3	
♎	0	58	29	57	29	0	♏

The

The Table *of the Angle Orient, or Altitude of the Nonagesimus Degree, continued.*

Aſcen.	57		58		Aſcen.	
°	°	′	°	′	°	
♈ 0	9	31	8	31	0	♈
3	9	31	8	31	27	
6	9	31	8	31	24	
9	9	35	8	35	21	
12	9	40	8	40	18	
15	9	45	8	45	15	
18	9	50	8	50	12	
21	9	55	8	55	9	
24	10	5	9	5	6	
27	10	15	9	15	3	
♉ 0	10	30	9	25	0	♓
3	10	45	9	40	27	
6	11	0	9	50	24	
9	11	15	10	5	21	
12	11	35	10	25	18	
15	11	55	10	45	15	
18	12	20	11	5	12	
21	12	50	11	35	9	
24	13	15	12	0	6	
27	13	50	12	30	3	
♊ 0	14	30	13	5	0	♒
3	15	0	13	40	27	
6	15	45	14	20	24	
9	16	30	15	5	21	
12	17	20	15	20	18	
15	18	15	16	45	15	
18	19	10	17	45	12	
21	20	15	18	45	9	
24	21	25	19	55	6	
27	22	35	21	5	3	
♋ 0	23	50	22	20	0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		57°		58°		Ascen	
	°					°	
♋	0	23	50	22	20	0	♎
	3	25	10	23	40	27	
	6	26	35	25	5	24	
	9	28	0	26	35	21	
	12	29	10	28	5	18	
	15	31	5	29	35	15	
	18	32	35	31	10	12	
	21	34	10	32	50	9	
	24	35	45	34	25	6	
	27	37	25	36	0	3	
♌	0	38	55	37	40	0	♐
	3	40	30	39	10	27	
	6	41	55	40	40	24	
	9	43	25	42	10	21	
	12	44	50	43	35	18	
	15	46	10	44	50	15	
	18	47	25	46	15	12	
	21	48	40	47	30	9	
	24	49	45	48	40	6	
	27	50	55	49	45	3	
♍	0	51	50	50	45	0	♑
	3	52	40	51	35	27	
	6	53	30	52	25	24	
	9	54	10	53	10	21	
	12	54	50	53	45	18	
	15	55	20	54	15	15	
	18	55	45	54	45	12	
	21	56	5	55	5	9	
	24	56	20	55	20	6	
	27	56	29	55	29	3	
♎	0	56	29	55	29	0	♒

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		59		60		Ascen.	
	°	°	′	°	′	°	
♈	0	7	31	6	31	0	♈
	3	7	31	6	31	27	
	6	7	21	6	31	24	
	9	7	35	6	35	21	
	12	7	40	6	40	18	
	15	7	45	6	45	15	
	18	7	50	6	45	12	
	21	7	55	6	50	9	
	24	8	0	7	0	6	
	27	8	10	7	5	3	
♉	0	8	23	7	15	0	♓
	3	8	35	7	25	27	
	6	8	45	7	35	24	
	9	9	0	7	50	21	
	12	9	15	8	5	18	
	15	9	30	8	25	15	
	18	9	55	8	40	12	
	21	10	20	9	10	9	
	24	10	55	9	25	6	
	27	11	35	9	55	3	
♊	0	11	10	10	20	0	♒
	3	12	55	10	55	27	
	6	13	45	11	35	24	
	9	13	40	12	10	21	
	12	14	25	12	55	18	
	15	15	20	13	45	15	
	18	16	15	14	40	12	
	21	17	15	15	40	9	
	24	18	20	16	45	6	
	27	19	30	17	55	3	
♋	0	20	45	19	10	0	♑

The

The Table of the Angle Orient, or Altitude of the Nonageſime Degree, continued.

Aſcen.		59		60		Aſcen.	
	°	°	′	°	′	°	
♋	0	20	45	19	10	0	♍
	3	22	10	20	55	27	
	6	23	0	22	0	24	
	9	25	35	23	35	21	
	12	26	35	25	0	18	
	15	28	10	26	40	15	
	18	29	45	28	15	12	
	21	31	25	29	55	9	
	24	33	0	31	35	6	
	27	34	40	33	15	3	
♌	0	36	20	34	55	0	♎
	3	37	50	36	30	27	
	6	39	25	38	5	24	
	9	40	50	39	40	21	
	12	42	25	41	10	18	
	15	43	45	42	35	15	
	18	45	10	43	55	12	
	21	46	20	45	15	9	
	24	47	30	46	25	6	
	27	48	35	47	30	3	
♍	0	49	40	48	35	0	♏
	3	50	30	49	30	27	
	6	51	25	50	20	24	
	9	52	5	51	5	21	
	12	52	45	51	40	18	
	15	53	15	52	15	15	
	18	53	45	52	45	12	
	21	54	5	53	5	9	
	24	54	20	53	20	6	
	27	54	29	53	29	3	
♎	0	54	29	53	29	0	♐

A Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen. °	61 ° ′	62 ° ′	Ascen. ° ′
♈ 0	5 31	4 31	0 ♉
3	5 31	4 31	27
6	5 31	4 31	24
9	5 31	4 31	21
12	5 35	4 35	18
15	5 40	4 40	15
18	5 40	4 40	12
21	5 45	4 45	9
24	5 55	4 50	6
27	6 0	4 55	3
♉ 0	6 10	5 5	0 ♓
3	6 20	5 10	27
6	6 30	5 20	24
9	6 45	5 30	21
12	6 50	5 40	18
15	7 10	5 55	15
18	7 25	6 10	12
21	7 45	6 25	9
24	8 10	6 45	6
27	8 30	7 10	3
♊ 0	9 0	7 30	0 ♒
3	9 30	8 0	27
6	10 5	8 30	24
9	10 40	9 5	21
12	11 20	9 40	18
15	12 10	10 25	15
18	13 0	11 15	12
21	14 0	12 15	9
24	15 5	13 15	6
27	16 15	14 25	3
♋ 0	17 25	15 35	0 ♑

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		61		62		Ascen.	
	°	°	′	°	′	°	
♋	0	17	25	15	30	0	♎
	3	18	50	17	0	27	
	6	20	15	18	25	24	
	9	21	45	20	0	21	
	12	23	20	21	40	18	
	15	25	0	23	20	15	
	18	26	40	25	5	12	
	21	28	20	26	45	9	
	24	30	5	28	10	6	
	27	31	50	30	20	3	
♌	0	33	30	32	5	0	♐
	3	35	15	33	50	27	
	6	36	50	35	50	24	
	9	38	25	37	5	21	
	12	49	55	38	40	18	
	15	41	25	40	10	15	
	18	42	45	41	35	12	
	21	44	5	42	50	9	
	24	45	20	44	5	6	
	27	46	25	45	15	3	
♍	0	47	25	46	10	0	♏
	3	48	20	47	0	27	
	6	49	20	48	10	24	
	9	50	0	49	0	21	
	12	51	40	49	40	18	
	15	51	15	50	15	15	
	18	51	40	50	40	12	
	21	52	0	51	0	9	
	24	52	15	51	15	6	
	27	52	25	51	25	3	
♎	0	52	29	51	29	0	♑

The Table of the Angle Orient, an Altitude of the Nonagesime Degree, continued.

Ascen.	63	64	Ascen.
♈ 0	3 31	2 31	0 ♈
3	3 31	2 31	27
6	3 31	2 31	24
9	3 31	2 31	21
12	3 35	2 31	18
15	3 35	2 35	15
18	3 35	2 35	12
21	3 40	2 35	9
24	3 45	2 40	6
27	3 50	2 45	3
♉ 9	3 55	2 50	0 ♓
3	4 0	2 55	27
6	4 10	3 0	24
9	4 15	3 5	21
12	4 25	3 15	18
15	4 40	3 20	15
18	4 50	3 30	12
21	5 5	3 45	9
24	5 25	3 55	6
27	5 40	4 10	3
♊ 0	6 0	4 25	0 ♒
3	6 25	4 45	27
6	6 55	5 10	24
9	7 20	5 35	21
12	8 0	6 5	18
15	8 40	6 45	15
18	9 25	7 20	12
21	10 15	8 10	9
24	11 15	9 5	6
27	12 25	10 10	3
♋ 0	13 40	11 25	0 ♑

The Table of the Angle Orient, or Altitude of the Nonageſime Degree, continued.

Aſcen. °	63 °	′	64 °	′	Aſcen. °	
♋ 0	13	40	11	25	0	♈
3	15	0	12	45	27	
6	16	30	14	15	24	
9	18	5	15	55	21	
12	19	45	17	40	18	
15	21	30	19	30	15	
18	23	15	21	25	12	
21	25	5	23	15	9	
24	26	55	25	30	6	
27	28	45	27	5	3	
♌ 0	30	35	29	0	0	♉
3	32	20	30	50	27	
6	34	5	32	40	24	
9	35	45	34	20	21	
12	37	20	36	0	18	
15	38	50	37	35	15	
18	40	15	39	5	12	
21	41	40	40	30	9	
24	42	50	41	45	6	
27	44	10	43	0	3	
♍ 0	45	15	44	5	0	♊
3	46	15	45	5	27	
6	47	5	46	0	24	
9	47	55	46	50	21	
12	48	35	47	35	18	
15	49	10	48	10	15	
18	49	40	48	40	12	
21	50	0	49	0	9	
24	50	15	49	15	6	
27	50	25	49	25	3	
♎ 0	50	29	49	29	0	♋

T

The Table *of the Angle Orient, or Altitude of the Nonageſimus Degree, continued.*

Aſcen.	65	66	Aſcen.
°	° ′	° ′	°
♈ 0	1 31	0 31	0 ♈
3	1 31	0 31	27
6	1 31	0 31	24
9	1 31	0 31	21
12	1 31	0 31	18
15	1 31	0 31	15
18	1 35	0 31	12
21	1 35	0 31	9
24	1 35	0 31	6
27	1 40	0 31	3
♉ 0	1 40	0 35	0 ♓
3	1 45	0 35	27
6	1 45	0 35	24
9	1 50	0 35	21
12	1 55	0 40	18
15	2 0	0 40	15
18	2 10	0 40	12
21	2 15	0 45	9
24	2 25	0 45	6
27	2 35	0 50	3
♊ 0	2 45	0 55	0 ♒
3	3 0	1 0	27
6	3 15	1 10	24
9	3 30	1 15	21
12	3 55	1 20	18
15	4 20	1 40	15
18	4 55	1 55	12
21	5 40	2 20	9
24	6 35	2 55	6
27	7 35	3 45	3
♋ 0	8 40	4 50	0 ♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Aſcen.		65		66		Aſcen.	
	°	°	′	°	′	°	
♋	0	8	40	4	50	0	♍
	3	10	0	6	20	27	
	6	11	35	8	10	24	
	9	13	25	10	5	21	
	12	15	20	12	20	18	
	15	17	15	14	30	15	
	18	19	15	16	45	12	
	21	21	15	19	0	9	
	24	23	15	21	10	6	
	27	25	15	23	20	3	
♌	0	27	20	25	30	0	♐
	3	29	15	27	35	27	
	6	31	10	29	35	24	
	9	32	55	31	25	21	
	12	34	35	33	15	18	
	15	36	15	34	55	15	
	18	37	45	36	30	12	
	21	39	15	38	0	9	
	24	40	40	40	20	6	
	27	41	55	40	40	3	
♍	0	44	0	41	50	0	♏
	3	44	0	42	55	27	
	6	45	55	43	55	24	
	9	45	50	44	45	21	
	12	46	35	45	25	18	
	15	47	10	46	5	15	
	18	47	40	46	35	12	
	21	48	0	47	0	9	
	24	48	15	47	15	6	
	27	48	25	47	25	3	
♎	0	48	29	47	29	0	♑

The

The Table of the Angle Orient, or Altitude of the Nonageſim Degree, continued.

Aſcen. °		66° 31′ ° ′	67 ° ′	Aſcen. °	
♈	0		0 29	0	♈
	3		0 0 29	27	
	6		0 0 31	24	
	9		0 0 31	21	
	12		0 0 31	18	
	15		0 0 31	15	
	18		0 0 31	12	
	21		0 0 31	9	
	24		0 0 31	6	
	27		0 0 31	3	
♉	0		0 0 35	0	♓
	3		0 0 35	27	
	6		0 0 35	24	
	9		0 0 40	21	
	12		0 0 40	18	
	15		0 0 40	15	
	18		0 0 40	12	
	21		0 0 45	9	
	24		0 0 45	6	
	27		0 0 50	3	
♊	0		0 0 55	0	♒
	3		0 1 0	27	
	6		0 1 10	24	
	9		0 1 15	21	
	12		0 1 20	18	
	15		0 1 40	15	
	18		0 1 55	12	
	21		0 2 20	9	
	24		0 2 55	6	
	27		0 3 45	3	
♋	0		0 4 50	0	♑

The Nonageſime Degree leaps in a Moment from the End of *Virgo* in the Weſt, to the Beginning of *Aries* in the Eaſt.

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued:

Aſcen.	66 31′	67	Aſcen.
♑ 0			0 ♋
3	2 35		27
6	5 10		24
9	7 45	5 5	21
12	10 20	6 0	18
15	12 50	10 20	15
18	15 20	13 25	12
21	17 45	16 5	9
24	19 5	18 40	6
27	22 20	21 5	3
♌ 0	24 35	23 30	0 ♊
3	26 45	25 45	27
6	28 45	27 50	24
9	30 40	29 50	21
12	32 30	31 40	18
15	34 10	32 25	15
18	35 50	35 5	12
21	37 25	36 45	9
24	38 45	38 15	6
27	40 5	39 15	3
♍ 0	41 20	40 40	0 ♉
3	42 25	41 45	27
6	43 20	42 45	24
9	44 15	43 40	21
12	45 0	44 30	18
15	45 40	45 5	15
18	46 10	45 35	12
21	46 30	46 0	9
24	46 45	46 15	6
27	46 55	46 25	3
♎ 0	46 58	46 29	0 ♈

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		68		69		Ascen.	
	°	°	′	°	′	°	
♈	0	1	29	2	29	0	♈
	3	1	31	2	31	27	
	6	1	31	2	31	24	
	9	1	35	2	35	21	
	12	1	35	2	35	18	
	15	1	35	2	35	15	
	18	1	35	2	40	12	
	21	1	40	2	45	9	
	24	1	40	2	50	6	
	27	1	45	2	55	3	
♉	0	1	45	3	0	0	♓
	3	1	50	3	5	27	
	6	1	55	3	15	24	
	9	2	0	3	25	21	
	12	2	10	3	35	18	
	15	2	15	3	45	15	
	18	2	25	4	5	12	
	21	2	30	4	25	9	
	24	2	45	4	50	6	
	27	3	0	5	25	3	
♊	0	3	25	6	30	0	♒
	3	3	55	8	30	27	
	6	4	45	10	50	24	
	9	6	35			21	
	12	8	45			18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	68		69		Ascen.
°	°	′	°	′	°
♋ 0					0 ♍
3					27
6					24
9					21
12					18
15					15
18	8	45			12
21	11	10			9
24	15	20	10	50	6
27	18	25	13	55	3
♌ 0	21	10	18	5	0 ♐
3	23	45	21	20	27
6	26	5	24	0	24
9	28	10	26	15	21
12	30	0	28	20	18
15	31	50	30	20	15
18	33	40	32	15	12
21	35	25	34	0	9
24	36	55	35	40	6
27	38	20	36	5	3
♍ 0	39	30	38	20	0 ♎
3	40	35	39	25	27
6	41	35	40	30	24
9	42	35	41	25	21
12	43	25	42	20	18
15	44	5	43	3	15
18	44	35	43	35	12
21	44	55	43	55	9
24	45	10	44	10	6
27	45	25	44	25	3
♎ 0	45	29	44	29	0 ♏

The Table of the Angle Orient, or Altitude of the Nonagesm Degree, continued.

Afcen.	70		71		Afcen.	
°	°	′	°	′	°	
♈ 0	3	29	4	29	0	♈
3	3	29	4	29	27	
6	3	35	4	35	24	
9	3	35	4	35	21	
12	3	35	4	35	18	
15	3	40	4	45	15	
18	3	45	4	50	12	
21	3	50	4	55	9	
24	3	55	5	5	6	
27	4	0	5	25	3	
♉ 0	4	10	5	35	0	♓
3	5	20	5	40	27	
6	5	35	6	0	24	
9	6	0	6	20	21	
12	6	35	6	45	18	
15	7	30	7	25	15	
18	9	0	8	10	12	
21	12	40	9	20	9	
24			11	0	6	
27			14	10	3	
♊ 0					0	♒
3					27	
6					24	
9					21	
12					18	
15					15	
18					12	
21					9	
24					6	
27					3	
♋ 0					0	♑

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continu'd.

Ascen.	70		71		Ascen.
°	°	′	°	′	°
♑ 0					0 ♋
3					27
6					24
9					21
12					18
15					15
18					12
21					9
24					6
27					3
♒ 0	12	40			0 ♌
3	17	40	14	10	27
6	21	10	16	55	24
9	24	5	21	20	21
12	26	25	24	35	18
15	28	35	26	35	15
18	30	40	29	5	12
21	32	35	31	0	9
24	34	20	32	40	6
27	35	55	34	25	3
♓ 0	37	10	35	50	0 ♍
3	38	15	37	5	27
6	39	25	38	15	24
9	40	25	39	15	21
12	41	15	40	10	18
15	42	0	40	55	15
18	42	35	41	30	12
21	42	45	41	55	9
24	43	15	42	15	6
27	43	25	42	25	3
♈ 0	43	29	42	29	0 ♎

The

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Aſcen.		72		73		Aſcen.	
	°	°	′	°	′	°	
♈	0	5	29	6	29	0	♈
	3	5	29	6	29	27	
	6	5	35	6	35	24	
	9	5	35	6	40	21	
	12	5	35	6	45	18	
	15	5	40	6	50	15	
	18	5	55	7	0	12	
	21	6	5	7	10	9	
	24	6	15	7	25	6	
	27	6	25	7	45	3	
♉	0	6	45	8	5	0	♓
	3	7	5	8	30	27	
	6	7	30	9	5	24	
	9	8	0	9	50	21	
	12	8	40	10	50	18	
	15	9	35	12	35	15	
	18	11	0	16	30	12	
	21	15	45			9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		72		73		Ascen.	
	°	°	′	°	′	°	
♋	0					0	♎
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♌	0					0	♐
	3					27	
	6					24	
	9	15	45			21	
	12	21	25	16	30	18	
	15	24	40	21	40	15	
	18	27	15	25	0	12	
	21	29	20	27	45	9	
	24	31	15	29	45	6	
	27	33	0	31	35	3	
♍	0	34	35	33	15	0	♑
	3	35	55	34	40	27	
	6	37	10	35	55	24	
	9	38	10	37	5	21	
	12	39	5	38	0	18	
	15	39	50	38	45	15	
	18	40	25	39	25	12	
	21	40	50	39	50	9	
	24	41	15	40	15	6	
	27	41	25	40	29	3	
♎	0	41	29	40	29	0	♒

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.		74		75		Ascen.	
	°	°	′	°	′	°	
♈	0	7	29	8	29	0	♈
	3	7	29	8	29	27	
	6	7	35	8	35	24	
	9	7	40	8	40	21	
	12	7	45	8	50	18	
	15	7	50	9	0	15	
	18	8	5	9	15	12	
	21	8	20	9	35	9	
	24	8	40	9	55	6	
	27	9	5	10	20	3	
♉	0	9	30	11	0	0	♓
	3	10	0	11	40	27	
	6	10	50	12	55	24	
	9	12	0	15	0	21	
	12	13	50	18	10	18	
	15	17	30			15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The

The Table of the Angle Orient, or Altitude of the Nonagesime Degrees, continued.

Ascent.	74 ° ′	75 ° ′	Ascen.
♑ 0			♎ 0
3			27
6			24
9			21
12			18
15			15
18			12
21			9
24			6
27			3
♒ 0			♍ 0
3			27
6			24
9			21
12			18
15	17 30		15
18	22 0	18 10	12
21	25 25	22 25	9
24	28 0	25 50	6
27	30 5	28 20	3
♓ 0	31 50	30 20	♌ 0
3	33 20	32 0	27
6	34 40	33 30	24
9	35 50	34 40	21
12	36 50	35 45	18
15	37 40	36 35	15
18	38 20	37 20	12
21	38 50	37 50	9
24	39 15	38 15	6
27	39 29	38 29	3
♈ 0	39 29	38 29	♋ 0

A Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		76		77		Ascen.	
	°	°	′	°	′	°	′
♈	0	9	29	10	29	0	♈
	3	9	29	10	29	27	
	6	9	35	10	35	24	
	9	9	40	10	45	21	
	12	9	55	11	0	18	
	15	10	10	11	15	15	
	18	10	25	11	35	12	
	21	10	45	12	0	9	
	24	11	10	12	35	6	
	27	11	45	13	30	3	
♉	0	12	40	14	35	0	♓
	3	13	55	16	40	27	
	6	15	55	19	45	24	
	9	19	5			21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The

The Table *of the* Angle Orient, *or* Altitude *of the Nonageſime Degree, continued.*

Aſcen.	76		77		Aſcen.	
°	°	′	°	′	°	
♋ 0					0	♎
3					27	
6					24	
9					21	
12					18	
15					15	
18					12	
21					9	
24					6	
27					3	
♌ 0					0	♏
3					27	
6					24	
9					21	
12					18	
15					15	
18					12	
21	19	5			9	
24	22	55	19	45	6	
27	26	20	23	30	3	
♍ 0	28	40	26	45	0	♐
3	31	40	28	55	27	
6	32	15	30	45	24	
9	33	30	32	15	21	
12	34	35	33	25	18	
15	35	25	34	20	15	
18	36	15	35	10	12	
21	36	45	35	45	9	
24	37	15	36	10	6	
27	37	29	36	29	3	
♎ 0	37	29	36	29	0	♑

The Table of the Angle Orient, or Altitude of the Nonagesim Degree, continued.

Ascen.		78		79		Ascen.	
	°	°	′	°	′	°	
♈	0	11	29	12	29	0	♈
	3	11	29	12	33	27	
	6	11	40	12	40	24	
	9	11	45	12	50	21	
	12	12	5	13	10	18	
	15	12	30	13	35	15	
	18	12	50	14	5	12	
	21	13	20	14	45	9	
	24	14	10	15	50	6	
	27	14	15	17	40	3	
♉	0	17	15	20	55	0	♓
	3	20	25			27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

T

The Table of the Angle Orient, or Altitude of the Nonagesime Degree, continued.

Ascen.	78	79	Ascen.
♑ 0	° ′	° ′	0 ♈
3			27
6			24
9			21
12			18
15			15
18			12
21			9
24			6
27			3
♒ 0			0 ♉
3			27
6			24
9			21
12			18
15			15
18			12
21			9
24			6
27	22 25		3
♓ 0	24 5	20 55	0 ♊
3	27 10	24 45	27
6	29 15	27 30	24
9	30 45	29 30	21
12	32 5	30 50	18
15	33 10	32 0	15
18	34 5	33 0	12
21	34 43	33 40	9
24	35 10	34 10	6
27	35 29	34 29	3
♈ 0	35 29	34 29	0 ♋

The

The Table of the Angle Orient, or Altitude of the Nonagesim. Degree, continued.

Ascen.		80		81		Ascen.	
	°	°	′	°	′	°	
♈	0	13	29	14	29	0	♈
	3	13	34	14	35	27	
	6	13	40	14	45	24	
	9	13	55	15	0	21	
	12	14	15	15	25	18	
	15	14	45	16	0	15	
	18	15	25	16	55	12	
	21	16	25	18	25	9	
	24	18	5	21	50	6	
	27	21	25			3	
♉	0					0	♓
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♊	0					0	♒
	3					27	
	6					24	
	9					21	
	12					18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♋	0					0	♑

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.	80	81	Ascen.
°	° ′	° ′	°
♋ 0			0 ♍
3			27
6			24
9			21
12			18
15			15
18			12
21			9
24			6
27			3
♌ 0			0 ♎
3			27
6			24
9			21
12			18
15			15
18			12
21			9
24			6
27			3
♍ 0			0 ♏
3	21 25		27
6	25 15	21 50	24
9	27 50	25 49	21
12	29 35	28 0	18
15	30 55	29 0	15
18	31 50	30 0	12
21	32 35	31 0	9
24	33 5	32 0	6
27	33 25	32 0	3
♎ 0	33 29	32 29	0 ♐

The

The Table of the Angle Orient, or Altitude of the Ninetyfirst Degree, continued.

Ascen.		82		83		Ascen.	
	o	o	′	o	′	o	
♈	0	15	29	16	29	0	♈
	3	15	35	16	35	27	
	6	15	45	16	50	24	
	9	16	5	17	15	21	
	12	16	40	17	55	18	
	15	17	25	19	5	15	
	18	18	50	22	30	12	
	21	22	10			9	
	24					6	
	27					3	
♉	0					0	♓
♊							
♋							♒
♌							
♍	0					0	♑
	3					27	♐
	6					24	
	9	22	10			21	
	12	26	5	22	30	18	
	15	28	10	26	30	15	
	18	29	30	28	20	12	
	21	30	25	29	15	9	
	24	31	5	30	0	6	
	27	31	25	30	25	3	
♎	0	31	29	30	29	0	♍

The

The Table *of the Angle Orient, or Altitude of the Nonagesime Degree, continued.*

Ascen.		84		85		Ascen.	
	°	°	′	°	′	°	
♈	0	17	29	18	29	0	♈
	3	17	35	18	40	27	
	6	17	55	19	0	24	
	9	18	25	19	45	21	
	12	19	25	21	35	18	
	15	21	55	23	0	15	
	18	22	45			12	
	21					9	
	24					6	
	27					3	
♉	0					0	♓
♊							♒
♋							♑
						9	
						6	
♌						3	♐
♍	0					0	♏
	3					27	
	6					24	
	9					21	
	12	22	45			18	
	15	23	40	23	0	15	
	18	26	45	24	35	12	
	21	28	5	26	45	9	
	24	28	55	27	50	6	
	27	29	25	28	20	3	
♎	0	29	29	28	29	0	♎

The Table *of the Angle Orient, or Altitude of the Nonagesim Degree, continued.*

Ascen.		86		87		Ascen.	
	°	°	′	°	′	°	
♈	0	19	29	20	29	0	♈
	3	19	40	20	45	27	
	6	20	10	21	35	24	
	9	21	30	23	10	21	
	12	25	10			18	
	15					15	
	18					12	
	21					9	
	24					6	
	27					3	
♉	0					0	♓
♊							
♋							♒
							♑
♌							
♍	0					0	♐
	3					27	♏
	6					24	
	9					21	
	12					18	
	15					15	
	18	23	10			12	
	21	25	5	23	10	9	
	24	26	40	25	15	6	
	27	27	20	26	15	3	
♎	0	27	29	26	29	0	♎

The

The Table of the Angle Orient, or Altitude of the Nonageſimo Degree, continued.

Aſcen.	88	89	90	Aſcen.
°	° ′	° ′	° ′	°
♈ 0	21 29	22 29	23 29	0 ♈
3	21 50	23 29		27
6	23 25			24
9				21
12				18
15				15
18				12
21				9
24				6
27				3
♉				0 ♓
♊				♒
♋				♑
♌ 0				0 ♐
3				27
6				24
9				21
12				18
15				15
18				12
21				9
24	23 25			6
27	25 5	23 29		3
♍ 0	25 29	23 29	23 29	0 ♎

Becauſe ♈ and ♎ are in the Horizon, the Nonageſime Degree is continually in ♋, going equally thro' all the Points of the Horizon, from the left Hand to the Right.

Sir Iſaac Newton's Table *of Refraction of the Heavenly Bodies.* Phil. Tranſact. N°. 368.

Appar. Alitit. °	'	Refrac. '	"	Appar. Altit. °	Refrac. '	"
0	0	33	45	16	3	4
0	15	30	24	17	2	53
0	20	27	35	18	2	43
0	45	25	11	19	2	34
1	0	23	7	20	2	26
1	15	21	20	21	2	18
1	30	19	46	22	2	11
1	45	18	22	23	2	5
2	0	17	8	24	1	59
2	30	15	2	25	1	54
3	0	13	20	26	1	49
3	30	11	57	27	1	44
4	0	10	48	28	1	40
4	30	9	50	29	1	36
5	0	9	2	30	1	32
5	30	8	21	31	1	28
6	0	7	45	32	1	25
6	30	7	14	33	1	22
7	0	6	47	34	1	19
7	30	6	22	35	1	16
8	0	6	0	36	1	13
8	30	5	40	37	1	11
9	0	5	22	38	1	8
9	30	5	6	39	1	6
10	0	4	52	40	1	4
11	0	4	27	41	1	2
12	0	4	5	42	1	0
13	0	3	47	43	0	58
14	0	3	31	44	0	56
15	0	3	17	45	0	54

Sir Iſaac Newton's Table *of Refraction, continued.*

Appar. Altit. °	Refrac. ′	″	Appar. Altit. °	Refrac. ′	″
46	0	52	76	0	14
47	0	50	77	0	13
48	0	48	78	0	12
49	0	47	79	0	11
50	0	45	80	0	10
51	0	44	81	0	9
52	0	42	82	0	8
53	0	40	83	0	7
54	0	39	84	0	6
55	0	38	85	0	5
56	0	36	86	0	4
57	0	35	87	0	3
58	0	34	88	0	2
59	0	32	89	0	1
60	0	31	90	0	0
61	0	30			
62	0	28			
63	0	27			
64	0	26			
65	0	25			
66	0	24			
67	0	23			
68	0	22			
69	0	21			
70	0	20			
71	0	19			
72	0	18			
73	0	17			
74	0	16			
75	0	15			

The

A Table *ſhewing the true Place of the Sun, anſwering every Degree of Declination.*

Declin. Sun. °	′	Sun's Place. °	′	″
0	0	0 ♈ 0 ♎	0	
1	0	2	30	37
2	0	5	1	28
3	0	7	32	48
4	0	10	4	54
5	0	12	38	2
6	0	15	12	27
7	0	17	48	30
8	0	20	26	31
9	0	23	6	53
10	0	25	50	4
11	0	28	36	34
		♉ ♌ ♏ ♒		
12	0	31	27	4
13	0	34	22	8
14	0	37	22	50
15	0	40	30	17
16	0	43	45	58
17	0	47	11	55
18	0	50	50	56
19	0	54	47	15
20	0	59	7	37
		♊ ♍ ♐ ♓		
21	0	64	4	14
22	0	70	3	56
23	0	78	40	50
23	29	90 ♋ 0 ♑	0	

Note, that theſe Signs, *viz. Aries, Taurus, Gemini, Cancer, Leo, Virgo,* are North Declination;

Libra, Scorpio, Sagittary, Capricorn, Aquarius, Piſces are South Declination.

The greateſt, mean, and leaſt daily Motions of ☉ and ☽ are theſe:

		°	′	″
Sun's	Greateſt	1	1	6
	Mean	0	59	8
	Leaſt	0	57	16
Moon's	Great.	15	32	50
	Mean	13	10	35
	Leaſt	11	36	20

The Greateſt and leaſt of the ☽ are Variable.

A

TABLE

OF THE

Moon's Parallax in Altitude, Longitude, and Latitude.

A Table *of the Moon's Parallax in Altitude,*

The Moon's Horizontal Parallax.										
Altit. Moon.	53′		54′		55′		56′		57′	
°	′	″	′	″	′	″	′	″	′	″
0	53	0	54	0	55	0	56	0	57	0
1	52	59	53	59	54	59	55	59	56	59
2	52	57	53	57	54	57	55	57	56	57
3	52	55	53	55	54	55	55	55	56	55
4	52	52	53	52	54	51	55	54	56	51
5	52	48	53	47	54	47	55	47	56	47
6	52	43	53	42	54	41	55	41	56	41
7	52	36	53	36	54	35	55	35	56	34
8	52	29	53	28	54	27	55	27	56	26
9	52	21	53	20	54	19	55	19	56	18
10	52	12	53	10	54	9	55	9	56	8
11	52	2	53	0	53	59	54	58	55	57
12	51	51	52	49	53	47	54	46	55	45
13	51	39	52	37	53	35	54	34	55	32
14	51	26	52	23	53	21	54	20	55	18
15	51	12	52	9	53	7	54	6	55	3
16	50	57	51	54	52	52	53	50	54	27
17	50	41	51	39	52	36	53	33	54	30
18	50	24	51	22	52	18	53	15	54	12
19	50	7	51	4	52	0	52	57	53	53
20	49	48	50	45	51	41	52	37	53	33
21	49	29	50	25	51	21	52	17	53	9
22	49	9	50	5	51	0	51	55	52	44
23	48	47	49	44	50	37	51	33	52	19
24	48	25	49	20	50	14	51	9	52	4
25	48	2	48	56	49	51	50	44	51	39
26	47	38	48	32	49	26	50	19	51	13
27	47	13	48	7	49	0	49	54	50	46
28	46	47	47	41	48	33	49	26	50	19
29	46	21	47	14	48	6	48	58	49	51
30	45	54	46	46	47	38	48	29	49	22

The

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon. °	58′		59′		60′		61′		62′	
	′	″	′	″	′	″	′	″	′	″
0	58	0	59	0	60	0	61	0	62	0
1	57	59	58	59	59	59	60	59	61	59
2	57	57	58	57	59	57	60	57	61	57
3	57	55	58	55	59	55	60	55	61	55
4	57	51	58	52	59	51	60	51	61	51
5	57	47	58	47	59	46	60	46	61	46
6	57	41	58	41	59	40	60	40	61	39
7	57	34	58	34	59	33	60	33	61	32
8	57	25	58	25	59	25	60	24	61	23
9	57	17	58	17	59	16	60	15	61	14
10	57	07	58	07	59	05	60	04	61	03
11	56	55	57	55	58	54	59	52	60	52
12	56	43	57	42	58	41	59	39	60	39
13	56	31	57	29	58	27	59	26	60	25
14	56	17	57	14	58	12	59	11	60	9
15	56	01	56	59	57	57	58	55	59	53
16	55	45	56	42	57	40	58	30	59	35
17	55	28	56	25	57	22	58	20	59	17
18	55	09	56	06	57	03	58	0	58	57
19	54	50	55	47	56	44	57	40	58	37
20	54	30	55	26	56	23	57	19	58	15
21	54	09	55	05	56	01	56	57	57	53
22	53	46	54	42	55	38	56	33	57	29
23	53	23	54	19	55	14	56	09	57	04
24	52	59	53	54	54	49	55	43	56	38
25	52	34	53	28	54	23	55	17	56	11
26	52	08	53	01	53	55	54	49	55	43
27	51	41	52	34	53	27	54	21	55	15
28	51	13	52	05	52	58	53	51	54	44
29	50	44	51	36	52	28	53	21	54	13
30	50	14	51	06	51	57	52	49	53	41

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon. °	53′		54′		55′		56′		57′	
	′	″	′	″	′	″	′	″	′	″
30	45	54	46	46	47	38	48	29	49	22
31	45	26	46	17	47	08	47	59	48	51
32	44	57	45	47	46	38	47	29	48	20
33	44	27	45	17	46	07	46	57	47	48
34	43	57	44	46	45	36	46	25	47	15
35	43	25	44	14	45	04	45	52	46	41
36	42	52	43	41	44	31	45	18	46	07
37	42	19	43	07	43	56	44	43	45	31
38	41	46	42	33	43	20	44	07	44	55
39	41	11	41	58	42	44	43	31	44	17
40	40	36	41	22	42	08	42	54	43	39
41	40	0	40	45	41	30	42	16	43	0
42	39	23	40	08	40	52	41	37	42	21
43	38	46	39	29	40	13	40	57	41	41
44	38	08	38	50	39	34	40	17	41	0
45	37	29	38	10	38	53	39	36	40	18
46	36	49	37	29	38	12	38	54	39	35
47	36	09	36	49	37	40	38	11	38	52
48	35	28	36	08	36	48	37	28	38	08
49	34	46	35	25	36	05	36	44	37	23
50	34	04	34	42	35	21	35	59	36	38
51	33	21	33	59	34	37	35	14	35	52
52	32	38	33	15	33	52	34	29	35	05
53	31	54	32	30	33	06	33	42	34	18
54	31	09	31	44	32	19	32	55	33	30
55	30	24	30	58	31	32	32	07	32	41
56	29	38	30	11	30	45	31	19	31	52
57	28	52	29	24	29	57	30	30	31	02
58	28	05	28	37	29	08	29	40	30	12
59	27	18	27	48	28	19	28	50	29	21
60	26	30	26	59	27	30	27	59	28	30

The

The Table *of the Moon's Parallax in Altitude, continued.*

The Moon's Horizontal Parallax.

Altit. Moon. °	58′		59′		60′		61′		62′	
	′	″	′	″	′	″	′	″	′	″
30	50	14	51	06	51	57	52	49	53	41
31	49	43	50	04	51	25	52	17	53	07
32	49	11	50	02	50	52	51	44	52	32
33	48	38	49	28	50	18	51	09	51	58
34	48	05	48	54	49	44	50	44	51	23
35	47	30	48	19	49	08	49	58	50	47
36	46	55	47	44	48	32	49	21	50	09
37	46	19	47	07	47	54	48	43	49	30
38	45	42	46	29	47	16	48	04	48	51
39	45	04	45	51	46	37	47	24	48	10
40	44	26	45	12	45	57	46	44	47	29
41	43	46	44	32	45	16	46	02	46	47
42	43	06	43	51	44	35	45	20	46	04
43	42	25	43	09	43	53	44	37	45	20
44	41	43	42	26	43	10	43	53	44	36
45	41	0	41	43	42	35	43	08	43	50
46	40	17	40	59	41	39	42	22	43	04
47	39	33	40	14	40	55	41	36	42	17
48	38	48	39	29	40	08	40	49	41	29
49	38	03	38	42	39	21	40	01	40	40
50	37	17	37	55	38	34	39	13	59	01
51	36	30	37	07	37	45	38	23	39	01
52	35	42	36	19	36	56	37	33	38	10
53	34	54	35	30	36	06	36	42	37	19
54	34	05	33	41	35	16	35	51	36	27
55	33	16	33	50	34	25	34	59	35	34
56	32	26	32	59	33	34	34	06	34	40
57	31	35	32	08	32	41	33	13	33	46
58	30	44	31	16	31	48	32	89	32	51
59	29	52	30	23	30	54	31	2	31	56
60	28	59	29	30	30	0	30	30	31	0

The Table of the Moon's Parallax in Altitude, continued.

The Moon's Horizontal Parallax.

Altit. Moon. °	53′		54′		55′		56′		57′	
	′	″	′	″	′	″	′	″	′	″
60	26	30	26	59	27	30	27	59	28	30
61	25	42	26	10	26	40	27	08	27	38
62	24	53	25	21	25	49	26	17	26	45
63	24	04	24	31	24	58	25	25	25	52
64	23	14	23	40	24	06	24	33	24	59
65	22	24	22	49	23	14	23	40	24	05
66	21	33	21	57	22	22	22	47	23	11
67	20	42	21	05	21	29	21	53	22	16
68	19	51	20	13	20	36	20	58	21	21
69	19	0	19	21	19	43	20	04	20	26
70	18	08	18	28	18	49	19	09	19	30
71	17	16	17	35	17	54	18	14	18	34
72	16	23	16	41	16	59	17	18	17	37
73	15	30	15	48	16	04	16	23	16	40
74	14	37	14	54	15	09	15	27	15	43
75	13	43	13	59	14	14	14	30	14	46
76	12	49	13	04	13	19	13	33	13	48
77	11	55	12	09	12	23	12	36	12	50
78	11	01	11	14	11	26	11	38	11	51
79	10	07	10	19	10	30	10	41	10	53
80	9	12	9	23	9	34	9	44	9	54
81	8	18	8	28	8	37	8	46	8	55
82	7	23	7	32	7	40	7	48	7	55
83	6	29	6	36	6	43	6	50	6	57
84	5	34	5	39	5	46	5	52	5	57
85	4	39	4	43	4	49	4	54	4	58
86	3	43	3	47	3	51	3	55	3	58
87	2	48	2	51	2	54	2	57	2	59
88	1	53	1	55	1	56	1	58	1	59
89	0	59	0	59	0	59	0	59	1	0
90	0	0	0	0	0	0	0	0	0	0

The Table *of the Moon's Parallax in Longitude, continued.*

The Moon's Horizonsal Parallax.

°	1 ′ ″	2 ′ ″	3 ′ ″	4 ′ ″	5 ′ ″	6 ′ ″
30	0 30	1 0	1 30	2 0	2 30	3 0
31	0 31	1 2	1 32	2 3	2 34	3 5
32	0 32	1 4	1 35	2 7	2 39	3 11
33	0 33	1 5	1 38	2 10	2 43	3 16
34	0 34	1 7	1 41	2 14	2 48	3 21
35	0 35	1 9	1 43	2 17	2 52	3 26
36	0 36	1 11	1 46	2 21	2 56	3 32
37	0 36	1 12	1 48	2 25	3 0	3 37
38	0 37	1 14	1 51	2 29	3 5	3 42
39	0 38	1 15	1 53	2 32	3 9	3 46
40	0 38	1 17	1 56	2 34	3 13	3 51
41	0 39	1 18	1 58	2 37	3 17	3 56
42	0 40	1 20	2 0	2 41	3 21	4 1
43	0 41	1 21	2 2	2 44	3 24	4 5
44	0 42	1 23	2 5	2 47	3 28	4 10
45	0 43	1 25	2 7	2 50	3 32	4 14
46	0 43	1 26	2 9	2 53	3 36	4 19
47	0 44	1 27	2 11	2 55	3 39	4 23
48	0 45	1 29	2 13	2 58	3 43	4 27
49	0 56	1 30	2 15	3 1	3 46	4 31
50	0 46	1 32	2 18	3 4	3 50	4 36
51	0 47	1 33	2 20	3 6	3 53	4 40
52	0 48	1 35	2 22	3 9	3 56	4 44
53	0 48	1 36	2 24	3 11	3 59	4 47
54	0 49	1 37	2 26	3 14	4 3	4 51
55	0 49	1 38	2 27	3 16	4 6	4 54
56	0 50	1 39	2 29	3 19	4 9	4 58
57	0 50	1 40	2 31	3 21	4 11	5 1
58	0 51	1 42	2 33	3 24	4 14	5 5
59	0 51	1 43	2 34	3 26	4 17	5 8
60	0 52	1 44	2 36	3 28	4 20	5 12

A Table *of the Moon's Parallax in Longitude.*

The Moon's Horizontal Parallax.

°	1 ′	1 ″	2 ′	2 ″	3 ′	3 ″	4 ′	4 ″	5 ′	5 ″	6 ′	6 ″
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	2	0	3	0	4	0	5	0	6
2	0	2	0	4	0	6	0	8	0	10	0	12
3	0	3	0	6	0	9	0	12	0	15	0	18
4	0	4	0	8	0	13	0	17	0	21	0	25
5	0	5	0	10	0	16	0	21	0	26	0	31
6	0	6	0	13	0	19	0	25	0	32	0	38
7	0	7	0	15	0	22	0	29	0	37	0	44
8	0	8	0	17	0	25	0	33	0	42	0	50
9	0	9	0	19	0	28	0	37	0	47	0	56
10	0	11	0	21	0	31	0	42	0	52	1	2
11	0	12	0	23	0	34	0	46	0	57	1	8
12	0	13	0	25	0	37	0	50	1	2	1	15
13	0	14	0	27	0	40	0	54	1	7	1	21
14	0	15	0	29	0	44	0	58	1	13	1	27
15	0	16	0	31	0	47	1	2	1	18	1	33
16	0	17	0	33	0	50	1	6	1	23	1	39
17	0	18	0	35	0	53	1	10	1	28	1	45
18	0	19	0	37	0	56	1	14	1	33	1	51
19	0	20	0	39	0	59	1	18	1	38	1	57
20	0	21	0	41	1	02	1	22	1	43	2	3
21	0	22	0	43	1	04	1	26	1	47	2	9
22	0	23	0	45	1	07	1	30	1	52	2	15
23	0	24	0	47	1	10	1	34	1	57	2	20
24	0	25	0	49	1	13	1	38	2	2	2	26
25	0	25	0	51	1	16	1	41	2	6	2	32
26	0	26	0	53	1	19	1	45	2	11	2	38
27	0	27	0	54	1	21	1	49	2	16	2	43
28	0	28	0	56	1	24	1	53	2	21	2	49
29	0	29	0	58	1	27	1	56	2	25	2	54
30	0	30	1	0	1	30	2	0	2	30	3	0

The Table *of the Moon's Parallax in Longitude, continued.*

The Moon's Horizonsal Parallax.

°	1 ′ ″	2 ′ ″	3 ′ ″	4 ′ ″	5 ′ ″	6 ′ ″
30	0 30	1 0	1 30	2 0	2 30	3 0
31	0 31	1 2	1 32	2 3	2 34	3 5
32	0 32	1 4	1 35	2 7	2 39	3 11
33	0 33	1 5	1 38	2 10	2 43	3 16
34	0 34	1 7	1 41	2 14	2 48	3 21
35	0 35	1 9	1 43	2 17	2 52	3 26
36	0 36	1 11	1 46	2 21	2 56	3 32
37	0 36	1 12	1 48	2 25	3 0	3 37
38	0 37	1 14	1 51	2 29	3 5	3 42
39	0 38	1 15	1 53	2 32	3 9	3 46
40	0 38	1 17	1 56	2 34	3 13	3 51
41	0 39	1 18	1 58	2 37	3 17	3 56
42	0 40	1 20	2 0	2 41	3 21	4 1
43	0 41	1 21	2 2	2 44	3 24	4 5
44	0 42	1 23	2 5	2 47	3 28	4 10
45	0 43	1 25	2 7	2 50	3 32	4 14
46	0 43	1 26	2 9	2 53	3 36	4 19
47	0 44	1 27	2 11	2 55	3 39	4 23
48	0 45	1 29	2 13	2 58	3 43	4 27
49	0 56	1 30	2 15	3 1	3 46	4 31
50	0 46	1 32	2 18	3 4	3 50	4 36
51	0 47	1 33	2 20	3 6	3 53	4 40
52	0 48	1 35	2 22	3 9	3 56	4 44
53	0 48	1 36	2 24	3 11	3 59	4 47
54	0 49	1 37	2 26	3 14	4 3	4 51
55	0 49	1 38	2 27	3 16	4 6	4 54
56	0 50	1 39	2 29	3 19	4 9	4 58
57	0 50	1 40	2 31	3 21	4 11	5 1
58	0 51	1 42	2 33	3 24	4 14	5 5
59	0 51	1 43	2 34	3 26	4 17	5 8
60	0 52	1 44	2 36	3 28	4 20	5 12

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	1 ′	1 ″	2 ′	2 ″	3 ′	3 ″	4 ′	4 ″	5 ′	5 ″	6 ′	6 ″
60	0	52	1	44	2	36	3	28	4	20	5	12
61	0	52	1	45	2	38	3	30	4	22	5	15
62	0	53	1	46	2	39	3	32	4	25	5	18
63	0	53	1	47	2	40	3	34	4	27	5	21
64	0	53	1	48	2	42	3	36	4	30	5	24
65	0	54	1	49	2	43	3	37	4	32	5	26
66	0	54	1	50	2	44	3	39	4	34	5	29
67	0	55	1	51	2	45	3	40	4	36	5	31
68	0	55	1	51	2	47	3	43	4	38	5	34
69	0	56	1	52	2	48	3	44	4	40	5	36
70	0	56	1	53	2	49	3	46	4	42	5	38
71	0	56	1	54	2	50	3	47	4	43	5	40
72	0	57	1	54	2	51	3	48	4	45	5	42
73	0	57	1	55	2	52	3	49	4	46	5	44
74	0	57	1	55	2	53	3	51	4	48	5	46
75	0	58	1	56	2	54	3	52	4	49	5	47
76	0	58	1	56	2	55	3	53	4	51	5	49
77	0	58	1	57	2	56	3	54	4	52	5	50
78	0	58	1	57	2	56	3	55	4	53	5	52
79	0	59	1	58	2	57	3	56	4	54	5	53
80	0	59	1	58	2	57	3	56	4	55	5	54
81	0	59	1	59	2	58	3	57	4	56	5	55
82	0	59	1	59	2	58	3	58	4	57	5	56
83	0	59	1	59	2	59	3	58	4	58	5	57
84	1	0	1	59	2	59	3	59	4	58	5	58
85	1	0	1	59	2	59	3	59	4	59	5	58
86	1	0	2	0	3	0	3	59	4	59	5	59
87	1	0	2	0	3	0	4	0	4	59	5	59
88	1	0	2	0	3	0	4	0	5	0	6	0
89	1	0	2	0	3	0	4	0	5	0	6	0
90	1	0	2	0	3	0	4	0	5	0	6	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☽	7 ′ ″	8 ′ ″	9 ′ ″	10 ′ ″	11 ′ ″
0	0 0	0 0	0 0	0 0	0 0
1	0 7	0 8	0 09	0 09	0 11
2	0 15	0 17	0 19	0 19	0 23
3	0 22	0 25	0 28	0 28	0 34
4	0 29	0 33	0 38	0 38	0 46
5	0 36	0 41	0 47	0 47	0 57
6	0 43	0 50	0 56	1 03	1 09
7	0 50	0 58	1 05	1 13	1 20
8	0 58	1 07	1 15	1 23	1 32
9	1 05	1 15	1 24	1 33	1 44
10	1 13	1 23	1 34	1 44	1 55
11	1 20	1 31	1 43	1 54	2 07
12	1 27	1 40	1 52	2 05	2 17
13	1 34	1 48	2 01	2 15	2 28
14	1 42	1 56	2 11	2 25	2 40
15	1 49	2 04	2 20	2 35	2 51
16	1 56	2 12	2 29	2 45	3 04
17	2 03	2 20	2 38	2 55	3 13
18	2 10	2 28	2 47	3 05	3 24
19	2 17	2 36	2 56	3 15	3 35
20	2 24	2 44	3 05	3 25	3 46
21	2 30	2 52	3 13	3 35	3 56
22	2 37	3 0	3 22	3 45	4 07
23	2 45	3 09	3 31	3 54	4 17
24	2 51	3 15	3 40	4 04	4 28
25	2 57	3 24	3 48	4 13	4 38
26	3 04	3 30	3 57	4 23	4 49
27	3 10	3 37	4 05	4 32	4 59
28	3 17	3 45	4 13	4 42	5 10
29	3 23	3 52	4 21	4 51	5 20
30	3 30	4 0	4 30	5 0	5 30

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☾	7		8		9		10		11	
	′	″	′	″	′	″	′	″	′	″
♓										
30	3	30	4	0	4	30	5	0	5	30
31	3	36	4	7	4	38	5	9	5	40
32	3	43	4	14	4	46	5	18	5	50
33	3	47	4	21	4	54	5	26	5	59
34	3	55	4	28	5	2	5	35	6	9
35	4	1	4	35	5	9	5	44	6	18
36	4	7	4	42	5	17	5	53	6	28
37	4	13	4	48	5	24	6	1	6	37
38	4	19	4	55	5	31	6	9	6	46
39	4	24	5	2	5	39	6	17	6	55
40	4	30	5	9	5	47	6	26	7	4
41	4	36	5	15	5	54	6	33	7	13
42	4	41	5	21	6	1	6	41	7	22
43	4	46	5	27	6	8	6	49	7	30
44	4	52	5	33	6	15	6	57	7	39
45	4	57	5	39	6	21	7	4	7	47
46	5	2	5	45	6	28	7	12	7	55
47	5	7	5	51	6	34	7	19	8	3
48	5	12	5	57	6	41	7	26	8	11
49	5	17	6	2	6	47	7	33	8	18
50	5	22	6	8	6	54	7	40	8	26
51	5	26	6	13	7	0	7	46	8	33
52	5	31	6	18	7	6	7	53	8	40
53	5	35	6	23	7	11	7	59	8	47
54	5	40	6	28	7	17	8	5	8	54
55	5	44	6	33	7	22	8	11	9	0
56	5	48	6	38	7	28	8	17	9	7
57	5	52	6	42	7	33	8	23	9	13
58	5	56	6	47	7	38	8	29	9	20
59	6	0	6	51	7	43	8	34	9	26
60	6	4	6	56	7	48	8	40	9	32

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☽	7		8		9		10		11	
	′	″	′	″	′	″	′	″	′	″
60	6	04	6	56	7	48	8	40	9	32
61	6	07	7	0	7	52	8	45	9	37
62	6	11	7	4	7	57	8	50	9	43
63	6	15	7	7	8	1	8	54	9	48
64	6	18	7	11	8	5	8	59	9	53
65	6	21	7	15	8	9	9	04	9	58
66	6	24	7	19	8	13	9	08	10	03
67	6	26	7	22	8	17	9	12	10	07
68	6	29	7	25	8	21	9	16	10	12
69	6	31	7	28	8	24	9	20	10	16
70	6	34	7	31	8	27	9	24	10	20
71	6	36	7	34	8	30	9	27	10	24
72	6	39	7	37	8	34	9	31	10	28
73	6	41	7	39	8	36	9	34	10	31
74	6	44	7	41	8	39	9	37	10	35
75	6	46	7	43	8	41	9	39	10	38
76	6	48	7	45	8	44	9	42	10	41
77	6	49	7	47	8	46	9	44	10	43
78	6	51	7	49	8	48	9	47	10	46
79	6	52	7	51	8	50	9	49	10	48
80	6	54	7	53	8	52	9	51	10	50
81	6	55	7	54	8	53	9	52	10	52
82	6	56	7	55	8	54	9	54	10	54
83	6	57	7	56	8	55	9	55	10	55
84	6	57	7	57	8	56	9	56	10	56
85	6	58	7	58	8	57	9	57	10	57
86	6	59	7	59	8	58	9	58	10	58
87	6	59	7	59	8	59	9	59	10	59
88	7	0	8	0	8	59	9	59	11	0
89	7	0	8	0	9	0	10	0	11	0
90	7	0	8	0	9	0	10	0	11	0

A Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

°	12 ′	12 ″	13 ′	13 ″	14 ′	14 ″	15 ′	15 ″	16 ′	16 ″
60	10	24	11	16	12	2	12	59	13	51
61	10	30	11	22	12	12	13	7	13	59
62	10	36	11	29	12	22	13	15	14	8
63	10	42	11	34	12	28	13	22	14	15
64	10	47	11	41	12	35	13	29	14	23
65	10	53	11	49	12	41	13	35	14	30
66	10	58	11	53	12	47	13	42	14	37
67	11	3	11	58	12	53	13	48	14	43
68	11	8	12	3	12	59	13	54	14	50
69	11	12	12	8	13	4	14	0	14	56
70	11	17	12	13	13	9	14	6	15	2
71	11	21	12	17	13	14	14	11	15	7
72	11	25	12	22	13	19	14	16	15	13
73	11	28	12	26	13	23	14	20	15	18
74	11	32	12	30	13	28	14	25	15	23
75	11	35	12	33	13	32	14	29	15	27
76	11	39	12	37	13	36	14	33	15	32
77	11	41	12	40	13	39	14	36	15	35
78	11	44	12	43	13	42	14	40	15	39
79	11	46	12	45	13	44	14	43	15	42
80	11	49	12	48	13	47	14	46	15	45
81	11	51	12	50	13	50	14	48	15	48
82	11	53	12	52	13	52	14	51	15	51
83	11	54	12	54	13	53	14	55	15	53
84	11	55	12	55	13	55	14	55	15	55
85	11	56	12	56	13	56	14	57	15	57
86	11	58	12	58	13	58	14	58	15	58
87	11	59	12	59	13	59	14	59	15	59
88	12	0	13	0	14	0	14	59	15	59
89	12	0	13	0	14	0	15	0	16	0
90	12	0	13	0	14	0	15	0	16	0

The Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

°	17 ′	17 ″	18 ′	18 ″	19 ′	19 ″	20 ′	20 ″	21 ′	21 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	17	0	18	0	19	0	21	0	22
2	0	35	0	37	0	40	0	42	0	44
3	0	53	0	56	0	59	1	03	1	06
4	1	11	1	15	1	19	1	24	1	28
5	1	29	1	34	1	39	1	45	1	50
6	1	47	1	53	1	59	2	05	2	12
7	2	04	2	11	2	19	2	26	2	33
8	2	22	2	30	2	39	2	47	2	55
9	2	39	2	48	2	58	3	08	3	17
10	2	57	3	07	3	18	3	28	3	39
11	3	14	3	25	3	37	3	49	4	0
12	3	32	3	44	3	57	4	09	4	22
13	3	49	4	02	4	16	4	29	4	44
14	4	07	4	21	4	36	4	50	5	05
15	4	24	4	39	4	55	5	11	5	26
16	4	41	4	58	5	14	5	31	5	47
17	4	58	5	16	5	33	5	52	6	08
18	5	15	5	34	5	52	6	11	6	29
19	5	32	5	51	6	11	6	30	6	50
20	5	49	6	09	6	30	6	50	7	11
21	6	05	6	26	6	48	7	09	7	31
22	6	22	6	44	7	07	7	29	7	52
23	6	38	7	01	7	25	7	48	8	13
24	6	55	7	19	7	44	8	08	8	32
25	7	11	7	36	8	02	8	27	8	52
26	7	27	7	53	8	20	8	46	9	12
27	7	42	8	10	8	37	9	04	9	31
28	7	57	8	27	8	55	9	23	9	51
29	8	13	8	43	9	12	9	41	10	10
30	8	30	9	0	9	30	10	0	10	30

The Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

°	17		18		19		20		21	
	′	″	′	″	′	″	′	″	′	″
30	8	30	9	0	9	30	10	0	10	30
31	8	45	9	16	9	45	10	18	10	49
32	9	01	9	33	10	05	10	37	11	08
33	9	15	9	48	10	21	10	54	11	26
34	9	30	10	04	10	37	11	11	11	44
35	9	45	10	19	10	52	11	28	12	02
36	10	0	10	35	11	10	11	45	12	21
37	10	14	10	50	11	26	12	02	12	38
38	10	28	11	05	11	42	12	19	12	56
39	10	42	11	19	11	57	12	35	13	13
40	10	56	11	34	12	13	12	51	13	30
41	11	09	11	48	12	28	13	07	13	46
42	11	23	12	03	12	43	13	23	14	03
43	11	36	12	16	12	57	13	39	14	19
44	11	49	12	30	13	02	13	54	14	35
45	12	01	12	43	13	26	14	08	14	50
46	12	14	12	57	13	40	14	23	15	06
47	12	26	13	09	13	53	14	37	15	21
48	12	38	13	22	14	07	14	52	15	36
49	12	49	13	34	14	20	15	04	15	50
50	13	01	13	47	14	33	15	19	16	05
51	13	12	13	59	14	45	15	32	16	19
52	13	24	14	11	14	58	15	46	16	33
53	13	35	14	22	15	10	15	58	16	46
54	13	45	14	34	15	22	16	11	16	59
55	13	55	14	44	15	33	16	23	17	11
56	14	05	14	55	15	45	16	35	17	24
57	14	15	15	05	15	56	16	46	17	36
58	14	25	15	16	16	07	16	58	17	49
59	14	34	15	25	16	17	17	08	18	0
60	14	43	15	35	16	27	17	19	18	11

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☾	17 ′	17 ″	18 ′	18 ″	19 ′	19 ″	20 ′	20 ″	21 ′	21 ″
60	14	43	15	35	16	27	17	19	18	11
61	14	52	15	44	16	32	17	29	18	22
62	15	01	15	54	16	47	17	40	18	33
63	15	09	16	2	16	56	17	50	18	43
64	15	17	16	11	17	5	17	59	18	53
65	15	24	16	19	17	13	18	8	19	2
66	15	32	16	27	17	22	18	16	19	11
67	15	39	16	34	17	29	18	25	19	20
68	15	46	16	41	17	37	18	33	19	28
69	15	52	16	48	17	44	18	40	19	36
70	15	59	16	55	17	51	18	48	19	44
71	16	05	17	1	17	57	18	55	19	51
72	16	10	17	7	18	4	19	1	19	58
73	16	15	17	12	18	10	19	8	20	5
74	16	21	17	18	18	16	19	14	20	1
75	16	25	17	23	18	21	19	20	20	17
76	16	30	17	29	18	26	19	25	20	23
77	16	34	17	33	18	30	19	30	20	28
78	16	38	17	37	18	35	19	34	20	32
79	16	41	17	40	18	39	19	38	20	37
80	16	44	17	43	18	43	19	42	20	41
81	16	47	17	46	18	46	19	45	20	45
82	16	50	17	49	18	49	19	48	20	48
83	16	52	17	52	18	52	19	51	20	51
84	16	54	17	54	18	55	19	53	20	53
85	16	56	17	56	18	56	19	55	20	55
86	16	57	17	57	18	57	19	57	20	57
87	16	58	17	58	18	58	19	58	20	58
88	16	59	17	59	18	59	19	59	20	59
89	17	0	18	0	19	0	20	0	21	0
90	17	0	18	0	19	0	20	0	21	6

A Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☽	22 ′	22 ″	23 ′	23 ″	24 ′	24 ″	25 ′	25 ″	26 ′	26 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	23	0	24	0	25	0	26	0	27
2	0	46	0	48	0	50	0	52	0	54
3	1	09	1	12	1	15	1	19	1	22
4	1	32	1	36	1	40	1	45	1	49
5	1	55	2	0	2	5	2	11	2	16
6	2	18	2	24	2	30	2	37	2	43
7	2	41	2	48	2	55	3	03	3	10
8	3	04	3	12	3	20	3	29	3	37
9	3	27	3	36	3	45	3	55	4	04
10	3	49	4	0	4	10	4	20	4	31
11	4	12	4	24	4	35	4	46	4	58
12	4	34	4	47	4	59	5	12	5	24
13	4	57	5	11	5	24	5	38	5	51
14	5	19	5	34	5	48	6	03	6	17
15	5	42	5	57	6	13	6	28	6	44
16	6	04	6	20	6	37	6	53	7	10
17	6	26	6	43	7	1	7	18	7	36
18	6	48	7	6	7	25	7	43	8	02
19	7	10	7	29	7	49	8	08	8	28
20	7	31	7	52	8	12	8	33	8	53
21	7	53	8	15	8	36	8	58	9	19
22	8	14	8	37	8	59	9	22	9	44
23	8	36	8	59	9	23	9	46	10	09
24	8	57	9	21	9	46	10	10	10	34
25	9	18	9	43	10	9	10	34	10	59
26	9	39	10	5	10	31	10	57	11	24
27	10	0	10	27	10	54	11	21	11	48
28	10	20	10	48	11	16	11	44	12	12
29	10	40	11	10	11	38	12	07	12	36
30	11	0	11	30	12	0	12	30	13	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizonsal Parallax.

°	22 ′ ″	23 ′ ″	24 ′ ″	25 ′ ″	26 ′ ″
30	11 0	11 30	12 0	12 30	13 00
31	11 20	11 51	12 22	12 53	13 24
32	11 40	12 12	12 44	13 16	13 48
33	11 59	12 42	13 06	13 38	14 10
34	12 18	12 52	13 25	13 59	14 32
35	12 37	13 12	13 46	14 21	14 54
36	12 56	13 31	14 06	14 42	15 17
37	13 15	13 50	14 26	15 04	15 39
38	13 33	14 09	14 46	15 23	16 0
39	13 51	14 28	15 06	15 44	16 22
40	14 08	14 47	15 26	16 04	16 43
41	14 26	15 05	15 45	16 24	17 05
42	14 43	15 23	16 04	16 44	17 24
43	15 0	15 41	16 22	17 03	17 44
44	15 17	15 59	16 40	17 22	18 04
45	15 34	16 16	16 58	17 41	18 23
46	15 50	16 33	17 16	17 59	18 42
47	16 06	16 49	17 33	18 17	19 01
48	16 21	17 05	17 50	18 35	19 19
49	16 36	17 21	18 07	18 52	19 37
50	16 51	17 37	18 23	19 09	19 55
51	17 06	17 53	18 39	19 26	20 12
52	17 20	18 08	18 55	19 43	20 29
53	17 34	18 22	19 10	19 58	20 46
54	17 48	18 36	19 25	20 13	21 02
55	18 01	18 50	19 40	20 28	21 18
56	18 14	19 04	19 54	20 43	21 33
57	18 27	19 17	20 08	21 08	21 48
58	18 39	19 30	20 21	21 12	22 03
59	18 51	19 43	20 34	21 26	22 17
60	19 03	19 55	20 47	21 39	22 31

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	22 ′	″	23 ′	″	24 ′	″	25 ′	″	26 ′	″
60	19	03	19	55	20	47	21	39	22	31
61	19	15	20	07	21	0	21	52	22	45
62	19	26	20	19	21	12	22	5	22	58
63	19	37	20	30	21	23	22	17	23	10
64	19	47	20	40	21	34	22	28	23	22
65	19	57	20	51	21	45	22	39	23	34
66	20	06	21	01	21	56	22	50	23	45
67	20	15	21	11	22	06	23	1	23	57
68	20	24	21	20	22	15	23	11	24	6
69	20	32	21	29	22	24	23	21	24	16
70	20	40	21	37	22	33	23	30	24	26
71	20	48	21	45	22	42	23	39	24	35
72	20	55	21	53	22	50	23	47	24	44
73	21	02	22	0	22	57	23	55	24	52
74	21	09	22	07	23	04	24	2	25	0
75	21	15	22	13	23	11	24	9	25	7
76	21	21	22	19	23	18	24	16	25	14
77	21	26	22	25	23	23	24	22	25	20
78	21	31	22	30	23	28	24	27	25	26
79	21	36	22	35	23	33	24	32	25	31
80	21	40	22	39	23	38	24	37	25	36
81	21	44	22	43	23	42	24	41	25	41
82	21	47	22	47	23	46	24	45	25	45
83	21	50	22	50	23	49	24	49	25	48
84	21	53	22	52	23	52	24	52	25	51
85	21	55	22	55	23	54	24	54	25	54
86	21	57	22	57	23	56	24	56	25	56
87	21	58	22	58	23	58	24	58	25	58
88	21	59	22	59	23	59	24	59	25	59
89	21	59	22	59	24	0	25	0	26	0
90	22	0	23	0	24	0	25	0	26	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	27 ′	27 ″	28 ′	28 ″	29 ′	29 ″	30 ′	30 ″	31 ′	31 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	28	0	29	0	30	0	32	0	33
2	0	56	0	58	1	0	1	03	1	05
3	1	25	1	28	1	31	1	35	1	38
4	1	52	1	57	2	01	2	06	2	10
5	2	21	2	26	2	32	2	37	2	42
6	2	49	2	55	3	02	3	08	3	14
7	3	18	3	25	3	32	3	39	3	47
8	3	45	3	54	4	02	4	11	4	19
9	4	13	4	23	4	32	4	42	4	51
10	4	41	4	52	5	02	5	13	5	23
11	5	09	5	20	5	32	5	44	5	55
12	5	37	5	49	6	02	6	14	6	26
13	6	05	6	18	6	32	6	45	6	58
14	6	32	6	46	7	01	7	16	7	30
15	6	59	7	15	7	30	7	46	8	02
16	7	26	7	43	7	59	8	16	8	33
17	7	53	8	11	8	28	8	45	9	04
18	8	20	8	39	8	57	9	16	9	35
19	8	47	9	07	9	26	9	46	10	06
20	9	14	9	34	9	55	10	16	10	36
21	9	41	10	02	10	24	10	45	11	06
22	10	07	10	29	10	52	11	14	11	36
23	10	33	10	56	11	20	11	43	12	06
24	10	59	11	23	11	48	12	12	12	36
25	11	25	11	51	12	16	12	41	13	06
26	11	50	12	16	12	43	13	09	13	35
27	12	15	12	43	13	10	13	37	14	04
28	12	40	13	09	13	37	14	05	14	33
29	13	05	13	35	14	04	14	33	15	02
30	13	30	14	0	14	30	15	0	15	30

The Table *of the Moon's Parallax in Longitude and Latitude continued.*

The Moon's Horizontal Parallax.

☾	27 ′	27 ″	28 ′	28 ″	29 ′	29 ″	30 ′	30 ″	31 ′	31 ″
30	13	30	14	0	14	30	15	0	15	30
31	13	55	14	26	14	57	15	27	15	58
32	14	19	14	51	15	23	15	54	16	26
33	14	42	15	15	15	48	16	21	16	53
34	15	5	15	39	16	12	16	47	17	20
35	15	29	15	53	16	38	17	13	17	47
36	15	52	16	27	17	3	17	38	18	13
37	16	15	16	51	17	27	18	3	18	39
38	16	37	17	14	17	51	18	28	19	5
39	16	59	17	37	18	15	18	53	19	31
40	17	21	18	0	18	38	19	17	19	56
41	17	43	18	22	19	1	19	41	20	21
42	18	4	18	44	19	24	20	5	20	45
43	18	26	19	6	19	47	20	28	21	9
44	18	45	19	27	20	9	20	51	21	32
45	19	5	19	48	20	31	21	13	21	55
46	19	25	20	9	20	52	21	35	22	18
47	19	45	20	29	21	14	21	57	22	40
48	20	4	20	48	21	33	22	18	23	2
49	20	23	21	8	21	53	22	40	23	24
50	20	41	21	27	22	13	22	59	23	45
51	20	59	21	46	22	32	23	19	24	7
52	21	17	22	4	22	51	23	39	24	26
53	21	34	22	22	23	9	23	58	24	46
54	21	50	22	39	23	27	24	16	25	5
55	22	7	22	56	23	45	24	34	25	24
56	22	23	23	13	24	2	24	52	25	42
57	22	39	23	29	24	19	25	10	26	0
58	22	54	23	45	24	36	25	27	26	17
59	23	9	24	0	24	52	25	43	26	34
60	23	23	24	15	25	7	25	59	26	51

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☽	27 ′	27 ″	28 ′	28 ″	29 ′	29 ″	30 ′	30 ″	31 ′	31 ″
♈										
60	23	23	24	15	25	7	25	59	26	51
61	23	37	24	30	25	22	26	15	27	7
62	23	51	24	44	25	37	26	30	27	22
63	24	04	24	57	25	51	26	44	27	37
64	24	16	25	10	26	4	26	58	27	52
65	24	28	25	23	26	20	27	12	28	8
66	24	40	25	35	26	30	27	25	28	23
67	24	51	25	47	26	42	27	37	28	34
68	25	02	25	58	26	53	27	49	28	45
69	25	12	26	9	27	4	28	1	28	57
70	25	22	26	19	27	15	28	12	29	8
71	25	32	26	29	27	25	28	20	29	19
72	25	41	26	38	27	35	28	32	29	29
73	25	49	26	47	27	44	28	42	29	39
74	25	57	26	55	27	53	28	51	29	48
75	26	05	27	3	28	1	28	59	29	57
76	26	12	27	11	28	9	29	7	30	5
77	26	18	27	17	28	16	29	14	30	12
78	26	24	27	23	28	22	29	21	30	19
79	26	30	27	29	28	28	29	27	30	26
80	26	35	27	34	28	33	29	33	30	32
81	26	40	27	39	28	38	29	38	30	37
82	26	44	27	44	28	43	29	43	30	42
83	26	48	27	48	28	47	29	47	30	46
84	26	51	27	51	28	50	29	50	30	50
85	26	54	27	54	28	53	29	53	30	53
86	26	56	27	56	28	56	29	56	30	55
87	26	58	27	58	28	58	29	58	30	57
88	26	59	27	59	28	59	29	59	30	59
89	27	0	28	0	29	0	30	0	31	0
90	27	0	28	0	29	0	30	0	31	0

A Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Hesizontal Parallax.

°	32 ′	″	33 ′	″	34 ′	″	35 ′	″	36 ′	″
0	0	0	0	0	0	0	0	0	0	0
1	0	33	0	35	0	36	0	37	0	38
2	1	6	1	9	1	11	1	13	1	15
3	1	40	1	44	1	47	1	50	1	53
4	2	14	2	18	2	22	2	26	2	31
5	2	47	2	53	2	58	3	3	3	9
6	3	20	3	27	3	33	3	39	3	46
7	3	54	4	2	4	9	4	16	4	14
8	4	27	4	36	4	44	4	52	5	1
9	5	0	5	10	5	19	5	29	5	38
10	5	33	5	44	5	54	6	5	6	15
11	6	6	6	18	6	29	6	41	6	52
12	6	39	6	51	7	4	7	16	7	29
13	7	12	7	25	7	39	7	52	8	6
14	7	44	7	59	8	14	8	28	8	43
15	8	17	8	33	8	48	9	4	8	19
16	8	49	9	6	9	22	9	39	9	55
17	9	21	9	39	9	56	10	14	10	31
18	9	53	10	12	10	3[illegible]	10	49	11	7
19	10	26	10	45	11	4	11	24	11	43
20	10	56	11	17	11	38	11	58	12	19
21	11	28	11	49	12	11	12	32	12	54
22	11	59	12	21	12	44	13	6	13	29
23	12	30	12	53	13	17	13	40	14	4
24	13	1	13	25	13	0	14	14	14	38
25	13	31	13	57	14	22	14	47	15	13
26	14	1	14	28	14	54	15	20	15	47
27	14	31	15	0	15	26	15	53	16	21
28	15	1	15	29	13	58	16	26	16	54
29	15	31	15	59	16	29	16	58	17	27
30	16	0	16	30	17	0	17	30	18	0

A Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

☽	′ 32 ″		′ 33 ″		′ 34 ″		′ 35 ″		′ 36 ″	
°										
30	16	25	16	30	17	0	17	36	18	0
31	16	29	17	0	17	31	18	2	18	33
32	16	57	17	29	18	1	18	33	19	5
33	17	25	17	58	18	31	19	3	19	38
34	17	53	18	27	19	1	19	33	20	8
35	18	21	18	56	19	30	20	5	20	39
36	18	48	19	24	19	59	20	34	21	10
37	19	16	19	52	20	28	21	4	21	40
38	19	43	20	19	20	56	21	33	22	13
39	20	9	20	46	21	24	22	2	22	39
40	20	34	21	13	21	51	22	30	23	6
41	21	0	21	39	22	18	22	58	23	37
42	21	25	22	5	22	45	23	25	24	5
43	21	50	22	31	23	11	23	52	24	33
44	22	14	22	56	23	37	24	19	25	1
45	22	38	23	20	24	3	24	45	25	28
46	23	1	23	44	24	28	25	11	25	54
47	23	25	24	8	24	52	25	36	26	20
48	23	46	24	31	25	16	26	0	26	45
49	24	9	24	54	25	40	26	25	27	10
50	24	31	25	17	26	3	26	49	27	35
51	24	52	25	39	26	26	27	12	27	59
52	25	13	26	0	26	48	27	55	28	22
53	25	33	26	21	27	9	27	57	28	45
54	25	53	26	42	27	30	28	19	29	7
55	26	12	27	2	27	51	28	40	29	29
56	26	31	27	21	28	11	29	1	29	50
57	26	50	27	40	28	31	29	21	30	11
58	27	08	27	59	28	50	29	41	30	32
59	27	26	28	17	29	9	30	0	30	52
60	27	43	28	35	29	27	30	19	31	11

A Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax

°	32 ′	32 ″	33 ′	33 ″	34 ′	34 ″	35 ′	35 ″	36 ′	36 ″
60	27	43	28	35	29	27	30	19	31	11
61	27	59	28	52	29	44	30	37	31	29
62	28	15	29	8	30	1	30	54	31	47
63	28	31	29	24	30	18	31	11	32	5
64	28	46	29	40	30	34	31	28	32	22
65	29	0	29	55	30	49	31	44	32	38
66	29	14	30	9	31	4	31	59	32	53
67	29	27	30	23	31	18	32	13	33	8
68	29	40	30	36	31	32	32	27	33	23
69	29	52	30	49	31	45	32	40	33	37
70	30	4	31	1	31	57	32	53	33	50
71	30	15	31	15	32	9	33	5	34	2
72	30	26	31	23	32	20	33	17	34	14
73	30	36	31	34	32	31	33	28	34	26
74	30	49	31	44	32	41	33	39	34	37
75	30	55	31	53	32	51	33	49	34	47
76	31	3	32	2	33	0	33	58	34	56
77	31	11	32	10	33	8	34	6	35	5
78	31	19	32	17	33	15	34	14	35	13
79	31	24	32	24	33	22	34	21	35	20
80	31	30	32	30	33	29	34	28	35	27
81	31	36	32	36	33	35	34	34	35	33
82	31	41	32	41	33	40	34	40	35	39
83	31	45	32	45	33	45	34	44	35	44
84	31	49	32	49	33	49	34	48	35	48
85	31	52	32	52	33	52	34	52	35	52
86	31	55	32	55	33	55	34	55	35	55
87	31	57	32	57	33	57	34	57	35	57
88	31	59	32	59	33	59	34	59	35	59
89	32	0	33	0	34	0	35	0	36	0
90	32	0	33	0	34	0	35	0	36	0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	37 ′	37 ″	38 ′	38 ″	39 ′	39 ″	40 ′	40 ″	41 ′	41 ″
0	0	0	0	0	0	0	0	0	0	0
1	0	39	0	40	0	41	0	42	0	43
2	1	17	1	19	1	21	1	23	1	25
3	1	56	1	59	2	2	2	5	2	9
4	2	39	2	39	2	43	2	47	2	52
5	3	14	3	19	3	24	3	29	3	35
6	3	52	3	58	4	4	4	11	4	17
7	4	31	4	28	4	45	5	53	5	0
8	5	9	5	17	5	26	5	34	5	42
9	5	47	5	57	8	6	6	16	6	25
10	6	25	6	36	6	46	6	57	7	7
11	7	3	7	15	7	26	7	38	7	49
12	7	41	7	54	8	6	8	19	8	31
13	8	19	8	33	8	46	9	0	9	13
14	8	57	9	12	9	26	9	41	9	55
15	9	35	9	50	10	6	10	21	10	37
16	10	12	10	28	10	45	11	1	11	18
17	10	49	11	6	11	24	11	41	11	59
18	11	26	11	44	12	3	12	21	12	40
19	12	3	12	22	12	42	13	1	13	21
20	12	39	13	0	13	20	13	41	14	1
21	13	15	13	37	13	58	14	20	14	40
22	13	51	14	14	14	36	14	59	15	19
23	14	27	14	51	15	14	15	38	16	58
24	15	3	15	27	15	52	16	16	16	40
25	15	38	16	3	16	29	16	54	17	19
26	16	13	16	39	17	6	17	32	17	58
27	16	48	17	15	17	42	18	10	18	37
28	17	22	17	50	18	18	18	47	19	15
29	17	56	18	25	18	54	19	24	19	54
30	18	30	19	0	19	30	20	0	20	[illegible]

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	37′	37″	38′	38″	39′	39″	40′	40″	41′	41″
30	18	30	19	0	19	30	20	0	20	30
31	19	4	19	34	20	5	20	36	20	37
32	19	37	20	8	20	40	21	12	21	44
33	20	9	20	42	21	14	21	47	22	20
34	20	41	21	15	21	48	22	22	22	56
35	21	13	21	48	22	11	22	57	23	31
36	21	45	22	20	22	55	23	31	24	6
37	22	16	22	52	23	28	24	4	24	40
38	22	47	23	23	24	0	24	37	25	14
39	23	17	23	55	24	32	25	10	25	48
40	23	47	24	26	25	4	25	43	26	21
41	24	17	24	56	25	35	26	5	26	54
42	24	46	25	20	26	6	26	40	27	26
43	25	14	25	55	26	36	27	18	27	58
44	25	42	26	24	27	6	27	47	28	29
45	26	10	26	52	27	35	28	17	29	1
46	26	37	27	20	28	3	28	47	29	30
47	27	4	27	47	28	31	29	15	29	59
48	27	30	28	14	28	59	29	43	30	28
49	27	56	28	41	26	26	30	11	30	57
50	28	21	29	7	29	53	30	39	31	25
51	28	45	29	32	30	19	31	5	31	52
52	29	9	29	57	30	44	31	31	32	19
53	29	33	30	21	31	9	31	56	32	45
54	29	56	30	44	31	33	32	21	33	10
55	30	18	31	7	31	57	32	45	33	35
56	30	40	31	30	32	20	33	9	33	59
57	31	2	31	52	32	42	33	32	34	23
58	31	23	32	14	33	4	33	55	34	46
59	31	43	32	35	33	26	34	17	35	9
60	32	3	32	55	33	47	34	39	35	31

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	′ 37 ″		′ 38 ″		′ 39 ″		′ 40 ″		′ 41 ″	
60	32	3	32	55	33	47	34	39	35	31
61	32	22	33	14	34	7	34	59	35	52
62	32	40	33	33	34	26	35	19	36	12
63	32	58	33	51	34	45	35	38	36	32
64	33	16	34	9	35	3	35	57	36	51
65	33	32	34	26	35	21	36	15	37	9
66	33	48	34	43	35	38	36	33	37	27
67	34	3	34	59	35	54	36	49	37	44
68	34	18	35	14	36	10	37	5	38	1
69	34	32	35	29	36	25	37	20	38	17
70	34	46	35	43	36	39	37	35	38	32
71	34	59	35	56	36	53	37	49	38	46
72	35	11	36	9	37	6	38	3	39	0
73	35	23	36	21	37	11	38	15	39	13
74	35	34	36	32	37	30	38	27	39	25
75	35	45	36	44	37	41	38	38	39	37
76	35	55	36	53	37	51	38	49	39	48
77	36	3	37	2	38	0	38	58	39	57
78	36	11	37	10	38	9	39	7	40	6
79	36	19	37	18	38	17	39	15	40	14
80	36	26	37	25	38	24	39	23	40	22
81	36	32	37	32	38	31	39	30	40	29
82	36	38	37	38	38	37	39	37	40	36
83	36	43	37	43	38	42	39	42	40	41
84	36	48	37	47	38	47	39	47	40	46
85	36	51	37	51	38	51	39	51	40	50
86	36	54	37	54	38	54	39	54	40	54
87	36	57	37	57	38	57	39	57	40	57
88	36	59	37	59	38	59	39	59	40	59
89	37	0	38	0	39	0	40	0	41	0
90	37	0	38	0	39	0	40	0	41	0

A Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

☽	42′	43′	44′	45′	46′
	′ ″	′ ″	′ ″	′ ″	′ ″
0	0 0	0 0	0 0	0 0	0 0
1	0 44	0 45	0 46	0 47	0 48
2	1 27	1 30	1 32	1 34	1 36
3	2 12	2 15	2 18	2 21	2 24
4	2 56	3 0	3 4	3 8	3 12
5	3 40	3 45	3 50	3 55	4 0
6	4 23	4 29	4 36	4 41	4 48
7	5 7	5 14	5 22	5 29	5 36
8	5 51	5 59	6 7	6 16	6 24
9	6 4	6 44	6 53	7 3	7 12
10	7 17	7 28	7 38	7 49	7 59
11	8 1	8 12	8 24	8 35	8 46
12	8 44	8 56	9 9	9 21	9 33
13	9 27	9 40	9 54	10 7	10 21
14	10 10	10 24	10 39	10 53	11 8
15	10 52	11 8	11 23	11 39	11 55
16	11 34	11 51	12 2	12 24	12 41
17	12 16	12 34	12 51	13 9	13 27
18	12 58	13 17	13 35	13 54	14 13
19	13 40	14 0	14 19	14 39	14 59
20	14 22	14 42	15 3	15 23	15 44
21	15 4	15 24	15 46	16 7	16 29
22	15 44	16 6	16 29	16 51	17 13
23	16 25	16 48	17 12	17 35	17 58
24	17 5	17 29	17 54	18 18	18 42
25	17 45	18 10	18 36	19 1	19 26
26	18 25	18 51	19 17	19 45	20 10
27	19 4	19 31	19 58	20 25	20 55
28	19 43	20 11	20 39	21 7	21 36
29	20 22	20 51	21 20	21 49	22 18
30	21 0	21 30	22 0	22 30	23 0

The

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	′42″	′43″	′44″	′45″	′46″
30	21 0	21 30	22 0	22 30	23 0
31	21 38	22 09	22 40	23 11	23 42
32	22 16	22 47	23 19	23 51	24 23
33	23 53	23 14	23 58	24 31	25 3
34	23 29	24 3	24 36	25 10	25 43
35	24 5	24 40	25 14	25 49	26 23
36	24 41	25 16	25 52	26 27	27 2
37	25 16	25 52	26 29	27 5	27 42
38	25 51	26 28	27 5	27 42	28 19
39	26 26	27 3	27 41	28 19	28 57
40	27 00	27 38	28 17	28 55	29 34
41	27 33	28 12	28 52	29 31	30 11
42	28 06	28 46	29 27	30 7	30 47
43	28 39	29 19	30 1	30 42	31 12
44	29 11	29 52	30 34	31 16	31 57
45	29 42	30 24	31 7	31 49	32 32
46	30 13	30 56	31 39	32 22	33 6
47	30 43	31 28	32 11	32 54	33 39
48	31 12	31 57	32 42	33 26	34 11
49	31 42	32 27	33 13	33 57	34 43
50	32 11	32 57	33 43	34 28	35 14
51	32 40	33 25	34 12	34 58	35 46
52	33 8	33 53	34 40	35 28	36 15
53	33 33	34 20	35 8	35 56	36 44
54	33 58	34 47	35 35	36 24	37 13
55	34 24	35 13	36 2	36 51	37 41
56	34 49	35 39	36 28	37 18	38 8
57	35 13	36 4	36 54	37 44	38 35
58	35 37	36 28	37 19	38 10	39 1
59	36 0	36 52	37 43	38 34	39 26
60	36 23	37 15	38 7	38 58	39 50

The Table *of the Moon's Parallax in Longitude and Latitude; continued.*

The Moon's Horizontal Parallax.

°	42′	43′	44′	45′	46′
	″	″	″	″	″
60	36 23	37 15	38 7	38 58	32 50
61	36 44	37 37	38 29	39 21	40 14
62	37 5	37 58	38 51	39 44	40 37
63	37 25	38 20	39 12	40 6	40 59
64	37 45	38 39	39 33	40 27	41 21
65	38 4	38 58	39 53	40 47	41 43
66	38 22	39 17	40 12	41 7	42 2
67	38 40	39 35	40 30	41 25	42 21
68	38 57	39 52	40 48	41 43	42 39
69	39 13	40 8	41 5	42 0	42 57
70	39 28	40 24	41 21	42 17	43 14
71	39 43	40 39	41 36	42 33	43 30
72	39 57	40 54	41 51	42 48	43 45
73	40 10	41 7	42 5	43 2	43 59
74	40 23	41 20	42 18	43 16	44 13
75	40 35	41 32	42 30	43 28	44 26
76	40 46	41 44	42 42	43 40	44 39
77	40 56	41 54	42 53	43 51	44 49
78	41 5	42 5	43 2	44 1	44 59
79	41 13	42 12	43 11	44 10	45 9
80	41 21	42 21	43 20	44 19	45 18
81	41 28	42 28	43 27	44 27	45 26
82	41 35	42 35	43 34	44 34	45 33
83	41 41	42 41	43 40	44 40	45 39
84	41 46	42 46	43 45	44 45	45 45
85	41 50	42 50	43 49	44 49	45 49
86	41 54	42 54	43 53	44 53	45 53
87	41 57	42 57	43 56	44 56	45 56
88	41 59	42 59	43 59	44 59	45 58
89	42 0	43 0	44 0	45 0	45 59
90	42 0	43 0	44 0	45 0	46 0

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☽	47′	48′	49′	50′	51′
	′ ″	′ ″	′ ″	′ ″	′ ″
0	0 0	0 0	0 0	0 0	0 0
1	0 49	0 50	0 51	0 52	0 53
2	1 38	1 40	1 42	1 44	1 45
3	2 28	2 31	2 34	2 37	2 40
4	3 17	3 21	3 25	3 29	3 33
5	4 6	4 11	4 16	4 21	4 27
6	4 55	5 1	5 7	5 13	5 20
7	5 43	5 51	5 58	6 5	6 13
8	6 32	6 41	6 49	6 57	7 6
9	7 21	7 31	7 40	7 49	7 59
10	8 10	8 20	8 30	8 41	8 51
11	8 58	9 9	9 22	9 32	9 44
12	9 46	9 58	10 11	10 23	10 26
13	10 34	10 48	11 1	11 15	11 28
14	11 23	11 37	11 51	12 6	12 20
15	12 10	12 25	12 41	12 57	13 12
16	12 57	13 14	13 30	13 47	14 3
17	13 44	14 2	14 19	14 37	14 54
18	14 31	14 50	15 8	15 27	15 45
19	15 18	15 38	15 57	16 17	16 37
20	16 4	16 25	16 45	17 6	17 26
21	16 50	17 12	17 33	17 55	18 16
22	17 36	17 58	18 21	18 43	19 6
23	18 22	18 45	19 9	19 32	19 55
24	19 7	19 31	19 56	20 20	20 44
25	19 52	20 17	20 43	21 8	21 33
26	20 36	21 2	21 29	21 55	22 21
27	21 20	21 47	22 15	22 42	23 9
28	22 4	22 32	23 0	23 28	23 56
29	22 47	23 16	23 45	24 14	24 43
30	23 30	24 0	24 30	25 0	25 30

The Table *of the Moon's Parallax in Longitude and Latitude continued.*

The Moon's Horizontal Parallax.

°	47′	48′	49′	50′	51′
	″	″	″	″	″
30	23 30	24 0	24 30	25 0	25 30
31	24 15	24 45	25 14	25 45	26 16
32	24 55	25 26	25 58	26 30	27 2
33	25 36	26 18	26 41	27 14	27 47
34	26 17	26 50	27 24	27 57	28 31
35	26 58	27 32	28 6	28 40	29 15
36	27 38	28 15	28 48	29 25	29 59
37	28 17	28 53	29 29	30 5	30 42
38	28 56	29 31	30 10	30 47	31 24
39	29 35	30 10	30 50	31 28	32 6
40	30 13	30 51	31 30	32 8	32 47
41	30 50	31 29	32 9	32 48	33 28
42	31 27	32 7	32 47	33 27	34 8
43	32 3	32 44	33 25	34 6	34 47
44	32 39	33 21	34 2	34 44	35 26
45	33 14	33 53	34 39	35 21	36 4
46	33 49	34 32	35 15	35 58	36 41
47	34 22	35 6	35 50	36 24	37 18
48	34 55	35 40	36 25	37 9	37 54
49	35 28	36 13	36 59	37 44	38 29
50	36 0	36 46	37 32	38 18	39 4
51	36 31	37 18	38 5	38 51	39 38
52	37 2	37 50	38 37	39 24	40 11
53	37 32	38 20	39 8	39 56	40 43
54	38 1	38 50	39 38	40 27	41 15
55	38 29	39 19	40 8	40 57	41 47
56	38 57	39 47	40 37	41 27	42 16
57	39 25	40 15	41 5	41 56	42 46
58	39 52	40 42	41 33	42 24	43 15
59	40 17	41 8	42 0	42 51	43 43
60	40 42	41 34	42 26	43 18	44 10

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	47 ′	47 ″	48 ′	48 ″	49 ′	49 ″	50 ′	50 ″	51 ′	51 ″
60	40	42	41	34	42	26	43	16	44	10
61	41	6	41	59	42	51	43	44	44	36
62	41	30	42	23	43	16	44	9	45	2
63	41	53	42	46	43	40	44	33	45	27
64	42	15	43	9	44	3	44	57	45	51
65	42	37	43	50	44	25	45	19	46	14
66	42	56	43	51	44	46	45	41	46	36
67	43	16	44	11	45	6	46	2	46	57
68	43	3	44	30	45	26	46	22	47	17
69	43	53	44	48	45	45	46	41	47	37
70	44	10	45	6	46	3	46	59	47	56
71	44	26	45	23	46	20	47	16	48	13
72	44	42	45	39	46	36	47	33	48	30
73	44	57	45	54	46	51	47	49	48	46
74	45	11	46	9	47	6	48	4	49	2
75	45	24	46	22	47	20	48	18	49	16
76	45	37	46	3	47	33	48	32	49	30
77	45	48	46	46	47	44	48	43	49	42
78	45	58	46	57	47	55	48	54	49	53
79	46	8	47	7	48	5	49	4	50	3
80	46	17	47	16	48	15	49	14	50	13
81	46	25	47	24	48	23	49	23	50	22
82	46	33	47	32	48	31	49	31	50	30
83	46	39	47	38	48	38	49	37	50	37
84	46	44	47	44	48	44	49	43	50	43
85	46	49	47	49	48	49	49	48	50	48
86	46	53	47	53	48	53	49	52	50	52
87	46	56	47	56	48	56	49	55	50	55
88	46	58	47	58	48	58	49	58	50	58
89	46	59	47	59	48	59	49	59	50	59
90	47	0	48	0	49	0	50	0	51	0

A Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

°	′ 52 ″	′ 53 ″	′ 54 ″	′ 55 ″	′ 56 ″
0	0 0	0 0	0 0	0 0	0 0
1	0 54	0 55	0 57	0 58	0 59
2	1 48	1 50	1 53	1 55	1 57
3	2 43	2 46	2 50	2 53	2 56
4	3 38	3 42	3 46	3 50	3 54
5	4 32	4 37	4 42	4 48	4 52
6	5 26	5 32	5 38	5 45	5 50
7	6 20	6 28	6 35	6 42	6 49
8	7 14	7 23	7 31	7 39	7 47
9	8 8	8 18	8 27	8 36	8 45
10	9 2	9 12	9 22	9 33	9 43
11	9 55	10 7	10 18	10 30	10 41
12	10 48	11 1	11 13	11 26	11 38
13	11 42	11 55	12 9	12 22	12 35
14	12 3	12 49	13 4	13 18	13 32
15	13 28	13 43	13 54	14 14	14 29
16	14 20	14 36	14 53	15 9	15 25
17	15 12	15 29	15 47	16 4	16 22
18	16 4	16 22	16 41	16 59	17 18
19	16 56	17 15	17 35	17 54	18 15
20	17 47	18 7	18 28	18 48	19 8
21	18 38	18 59	19 21	19 42	20 5
22	19 28	19 51	20 13	20 36	21 58
23	20 19	20 42	21 6	21 29	21 52
24	21 9	21 33	21 58	22 23	22 46
25	21 59	22 24	22 49	23 14	23 39
26	22 48	23 14	23 40	24 6	24 32
27	23 36	24 4	24 31	24 58	25 25
28	24 25	24 53	25 21	25 49	26 17
29	25 13	25 42	26 11	26 40	27 9
30	26 0	26 30	27 0	27 30	28 0

To

The Table of the Moon's *Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

☾	52′		53′		54′		55′		56′	
°	′	″	′	″	′	″	′	″	′	″
30	26	0	26	30	27	0	27	20	28	0
31	26	47	27	18	27	49	28	20	28	50
32	27	34	28	5	28	37	29	9	29	40
33	28	20	28	52	29	25	29	57	30	29
34	29	5	29	38	30	12	30	45	31	18
35	29	50	30	24	30	58	31	34	32	7
36	30	34	31	9	31	44	32	22	32	55
37	31	18	31	53	32	29	33	7	33	42
38	32	1	32	37	33	14	33	51	34	28
39	32	43	33	21	33	59	34	36	35	14
40	33	25	34	4	34	43	35	21	35	59
41	34	7	34	46	35	26	36	5	36	44
42	34	48	35	28	36	8	36	48	37	28
43	35	28	36	9	36	52	37	31	38	11
44	36	8	36	49	37	31	38	13	38	54
45	36	47	37	29	38	11	38	54	39	36
46	37	25	38	8	38	51	39	34	40	17
47	38	2	38	46	39	29	40	13	40	57
48	38	38	39	23	40	7	40	52	41	36
49	39	14	40	0	40	45	41	30	42	15
50	39	50	40	36	41	22	42	8	42	54
51	40	25	41	11	41	58	42	45	43	31
52	40	59	41	46	42	33	43	21	44	8
53	41	32	42	19	43	7	43	55	44	43
54	42	4	42	52	43	41	44	29	45	18
55	42	35	43	24	44	14	45	2	45	52
56	43	6	43	56	44	46	45	35	46	26
57	43	36	44	28	45	17	46	7	46	58
58	44	6	44	57	45	48	46	39	47	29
59	44	34	45	26	46	17	47	9	47	59
60	45	2	45	54	46	46	47	38	48	29

The Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

°	52		53		54		55		56	
	′	″	′	″	′	″	′	″	′	″
60	45	2	45	54	46	40	47	38	48	29
61	45	29	46	21	47	14	48	6	48	58
62	45	55	46	48	47	41	48	34	49	27
63	46	20	47	13	48	7	49	0	49	54
64	46	45	47	38	48	32	49	26	50	20
65	47	8	48	2	48	56	49	51	50	45
66	47	30	48	25	49	20	50	15	51	9
67	47	52	48	47	49	42	50	38	51	32
68	48	13	49	9	50	4	51	0	51	54
69	48	33	49	29	50	25	51	21	52	15
70	48	52	49	48	50	45	51	41	52	35
71	49	10	50	7	51	4	52	0	52	55
72	49	27	50	25	51	22	52	19	53	15
73	49	44	50	41	51	39	52	36	53	33
74	50	0	50	57	51	55	52	53	53	50
75	50	14	51	12	52	10	53	8	54	6
76	50	28	51	26	52	25	53	23	54	21
77	50	40	51	38	52	37	53	36	54	34
78	50	52	51	50	52	49	53	48	54	46
79	51	2	52	1	53	0	53	59	54	57
80	51	12	52	11	53	10	54	10	55	7
81	51	21	52	20	53	19	54	19	55	17
82	51	30	52	29	53	28	54	28	55	26
83	51	37	52	36	53	35	54	35	55	34
84	51	43	52	42	53	42	54	42	55	42
85	51	48	52	47	53	47	54	47	55	47
86	51	52	52	52	53	52	54	52	55	52
87	51	55	52	55	53	55	54	55	55	53
88	51	58	52	58	53	58	54	58	55	57
89	51	59	52	59	53	59	54	59	55	59
90	52	0	53	0	54	0	55	0	56	0

The Table of the Moon's Parallax in Longitude and Latitude, continued.

The Moon's Horizontal Parallax.

☽	57′	″	58′	″	59′	″	60′	″	61′	″
0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	1	1	2	1	3	1	4
2	1	59	2	1	2	3	2	5	2	7
3	2	59	3	2	3	5	3	8	3	11
4	3	58	4	3	4	7	4	11	4	15
5	4	57	5	3	5	9	5	14	5	19
6	5	57	6	3	6	10	6	16	6	22
7	6	57	7	4	7	12	7	19	7	26
8	7	56	8	4	8	13	8	21	8	29
9	8	55	9	4	9	14	9	23	9	32
10	9	54	10	4	10	15	10	25	10	35
11	10	52	11	4	11	15	11	27	11	38
12	11	51	12	3	12	16	12	28	12	49
13	12	49	13	3	13	16	13	30	13	43
14	13	47	14	2	14	16	14	31	14	46
15	14	45	15	1	15	16	15	31	15	48
16	15	42	15	59	16	15	16	32	16	49
17	16	39	16	57	17	15	17	32	17	50
18	17	36	17	55	18	13	18	32	18	51
19	18	33	18	52	19	11	19	32	19	52
20	19	29	19	50	20	10	20	31	20	52
21	20	25	20	46	21	8	21	30	21	51
22	21	21	21	43	22	6	22	28	22	50
23	22	16	22	39	23	3	23	26	23	49
24	23	11	23	35	24	0	24	24	24	48
25	24	5	24	30	24	56	25	21	25	46
26	24	59	25	25	25	52	26	18	26	44
27	25	52	26	19	26	47	27	14	27	41
28	26	45	27	14	27	42	28	10	28	38
29	27	38	28	7	28	36	29	5	29	34
30	28	30	29	0	29	30	30	0	30	30

The

A Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

☾	57 ′	″	58 ′	″	59 ′	″	60 ′	″	61 ′	″
30	28	30	29	0	29	30	30	0	30	30
31	29	22	29	51	30	23	30	54	31	25
32	30	13	30	44	31	16	31	48	32	20
33	31	3	31	35	32	8	32	41	33	14
34	31	52	32	26	32	59	33	33	34	7
35	32	41	33	16	33	50	34	25	34	59
36	33	30	34	5	34	41	35	16	35	51
37	34	18	34	54	35	30	36	6	36	42
38	35	5	35	42	36	19	36	56	37	33
39	35	52	36	30	37	7	37	45	38	23
40	36	38	37	17	37	55	38	34	39	13
41	37	24	38	3	38	42	39	22	40	1
42	38	9	38	49	39	29	40	9	40	49
43	38	53	39	34	40	14	40	55	41	36
44	39	36	40	18	40	59	41	41	42	23
45	40	18	41	1	41	43	42	26	43	8
46	41	0	41	44	42	27	43	10	43	53
47	41	41	42	25	43	9	43	53	44	37
48	42	21	43	6	43	50	44	35	45	20
49	43	1	43	46	44	31	45	17	46	2
50	43	40	44	26	45	12	45	58	46	44
51	44	18	45	5	45	51	46	38	47	24
52	44	56	45	43	46	30	47	17	48	4
53	45	31	46	19	47	7	47	55	48	43
54	46	6	46	55	47	43	48	32	49	21
55	46	41	47	30	48	19	49	8	49	58
56	47	15	48	5	48	54	49	44	50	34
57	47	48	48	38	49	28	50	19	51	9
58	48	20	49	11	50	2	50	53	51	44
59	48	51	49	43	50	34	51	26	52	17
60	49	22	50	14	51	6	51	58	52	50

The Table *of the Moon's Parallax in Longitude and Latitude, continued.*

The Moon's Horizontal Parallax.

°	′ 57 ″	′ 58 ″	′ 59 ″	′ 60 ″	′ 61 ″
60	49 22	50 14	51 6	51 58	52 50
61	49 51	50 44	51 36	52 29	53 21
62	50 20	51 13	52 6	52 59	53 52
63	50 47	51 41	52 34	53 28	54 21
64	51 14	52 8	53 2	53 56	54 50
65	51 40	52 34	53 28	54 23	55 17
66	52 5	52 59	53 54	54 49	55 44
67	52 28	53 23	54 18	55 14	56 9
68	52 51	53 47	54 42	55 38	56 34
69	53 13	54 9	55 5	56 1	56 57
70	53 34	54 30	55 27	56 23	57 19
71	53 54	54 50	55 47	56 44	57 40
72	54 13	55 10	56 7	57 4	58 1
73	54 31	55 28	56 25	57 23	58 20
74	54 48	55 46	56 43	57 41	58 39
75	55 4	56 2	57 0	57 58	58 56
76	55 19	56 18	57 16	58 14	59 12
77	55 32	56 31	57 29	58 28	59 26
78	55 45	56 44	57 42	58 41	59 40
79	55 57	56 56	57 54	58 53	59 52
80	56 8	57 7	58 6	59 5	60 4
81	56 18	57 17	58 16	59 15	60 14
82	56 27	57 26	58 26	59 25	60 24
83	56 35	57 34	58 33	59 33	60 32
84	56 42	57 41	58 40	59 40	60 40
85	56 47	57 46	58 46	59 46	60 46
86	56 52	57 51	58 51	59 51	60 51
87	56 55	57 55	58 55	59 55	60 55
88	56 58	57 58	58 58	59 58	60 59
89	56 59	57 59	58 59	59 59	60 59
90	57 0	58 0	59 0	60 0	61 0

The Table of the Moon's Parallax in Longitude and Latitude continued.

The Moon's Horizontal Parallax.

°	62 ′	″	°	62 ′	″	°	62 ′	″
0	0	0	30	31	0	60	53	42
1	1	4	31	31	56	61	54	15
2	2	8	32	32	52	62	54	44
3	3	13	33	33	46	63	55	14
4	4	18	34	34	40	64	55	44
5	5	23	35	35	33	65	56	11
6	6	28	36	36	26	66	56	38
7	7	33	37	37	18	67	57	3
8	8	38	38	38	10	68	57	28
9	9	42	39	39	0	69	57	52
10	10	46	40	39	50	70	58	16
11	11	49	41	40	39	71	58	37
12	12	52	42	41	28	72	58	58
13	13	56	43	42	16	73	59	17
14	15	0	44	43	4	74	59	36
15	16	2	45	43	50	75	59	53
16	17	4	46	44	36	76	60	10
17	18	6	47	45	20	77	60	24
18	19	8	48	46	4	78	60	38
19	20	10	49	46	47	79	60	50
20	21	12	50	47	30	80	61	2
21	22	12	51	48	10	81	61	13
22	23	12	52	48	50	82	61	24
23	24	12	53	49	29	83	61	32
24	25	12	54	50	8	84	61	40
25	26	11	55	50	45	85	61	46
26	27	10	56	51	22	86	61	51
27	28	8	57	51	58	87	61	55
28	29	6	58	52	34	88	61	58
29	30	3	59	53	8	89	61	59
30	31	0	60	53	42	90	62	0

5. **Table** *of the Sun's Diſtance from the* Vertex *of* London, *to every Degree of Declination* N. *or* S. *uſeful in the Conſtruction of Solar Eclipſes.*

Sun's Declin. N. & S.		Sun's Decl. Nor. ☉a Ver. at Noon		at Midni.		Sun's Decl. Sou. ☉a Ver. at Noon		at Midni.	
°	′	°	′	°	′	°	′	°	′
0 ♈ ♎	0	51	32	51	32	51	32	51	32
1	0	50	32	52	32	52	32	50	32
2	0	49	32	53	32	53	32	49	32
3	0	48	32	54	32	54	32	48	32
4	0	47	32	55	32	55	32	47	32
5	0	46	32	56	32	56	32	46	32
6	0	45	32	57	32	57	32	45	32
7	0	44	32	58	32	58	32	44	32
8	0	43	32	59	32	59	32	43	32
9	0	42	32	60	32	60	32	42	32
10	0	41	32	61	32	61	32	41	32
11 ♉ ♍	0	40	32	62	32	62	32	40	32
12 ♏ ♑	0	39	32	63	32	63	32	39	32
13	0	38	32	64	32	64	32	38	32
14	0	37	32	65	32	65	32	37	32
15	0	36	32	66	32	66	32	36	32
16	0	35	32	67	32	67	32	35	32
17	0	34	32	68	32	68	32	34	32
18	0	33	32	69	32	69	32	33	32
19	0	32	32	70	32	70	32	32	32
20 ♊ ♌	0	31	32	71	32	71	32	31	32
21 ♐ ♒	0	30	32	72	32	72	32	30	32
22	0	29	32	73	32	73	32	29	32
23	0	28	32	74	32	74	32	28	32
23 ♍ ♋	29	28	3	75	1	75	1	28	3

A Table *of Logarithms for the Correction of the Moon's Variation.*

Mean Anomaly of the Sun.							
	Sig. 0.	Sig. 1.	Sig. 2	Sig. 3.	Sig.	Sig. 5.	
Deg	Logar.	Logar.	Logar	Logar.	Logar	Logar.	Deg.
0	0.0242	0.0211	0.0125	0.0004	9.9880	9.9787	30
2	0.0242	0.0207	0.0118	9.9995	9.9872	9.9783	28
4	0.0242	0.0203	0.0110	9.9987	9.9865	9.9779	26
6	0.0241	0.0198	0.0102	9.9978	9.9858	9.9775	24
8	0.0240	0.0193	0.0095	9.9969	9.9851	9.9772	22
10	0.0239	0.0188	0.0087	9.9961	9.9844	9.9769	20
12	0.0237	0.0182	0.0079	9.9952	9.9837	9.9766	18
14	0.0235	0.0177	0.0071	9.9944	9.9830	9.9763	16
16	0.0233	0.0171	0.0063	9.9936	9.9824	9.9760	14
18	0.0231	0.0165	0.0055	9.9928	9.9818	9.9758	12
20	0.0229	0.0159	0.0046	9.9920	9.9812	9.9757	10
22	0.0226	0.0153	0.0038	9.9912	9.9807	9.9755	8
24	0.0223	0.0146	0.0029	9.9904	9.9802	9.9754	6
26	0.0219	0.0139	0.0021	9.9896	9.9797	9.9753	4
28	0.0215	0.0132	0.0012	9.9888	9.9792	9.9753	2
30	0.0211	0.0125	0.0003	9.9880	9.9787	9.9753	0
	Sig. 11	Sig. 10.	Sig. 9.	Sig. 8.	Sig. 7.	Sig. 6.	

THE foregoing Table ſhould have been placed to follow the Table of the Moon's Variation, *Folio* 101. Its Uſe is, to find the true, or corrected Variation of the Moon. The other ſhews the Moon's greateſt Variation in the Octants, to be 35 Minutes, 10 Seconds: But then that is in the mean Diſtance of the Sun from the Earth.

The Differences that ariſe from the Curvature of the *Orbis Magnus*, and the ſtronger Action of the Sun upon the Moon when Horned and New, than when Gibbous and Full, are allow'd: For by this Table, the greateſt Variation in the other Diſtances of the Sun from the Earth, being in a Proportion compounded of the duplicate Ratio of the time of the Synodical Revolution of the Moon (the time of the Year being given) directly, and the triplicate Ratio of the Sun's Diſtance from the Earth inverſly. Whence Dr. *Halley*, by this Table, makes the greateſt Variation in the Sun's Apogee, 33 Minutes, 16 Seconds; and in his Perigee, 37 Minutes, 13 Seconds; the Eccentricity of the Sun being to the tranſverſe Diameter of the *Orbis Magnus*, as 16 $\frac{1}{2}$ to 1000.

To find the correct Variation by this Table, the Rule is,

Having found the Variation of the Moon, agreeing to her Diſtance from the Sun, by the Table, *Folio* 101, reduce the ſaid Variation into Seconds, and then find the Logarithm thereof, as if it was an Abſolute Number.

Next, with the Sun's Mean Anomaly take out of this Table the Logarithm anſwering thereto; and ſubtract it from the Logarithm firſt found; and the Remainder is the Logarithm of the correct Variation, as *per* Example.

In the Example of the Calculation of the Moon's Place, *Folio* 88, the Moon's Variation there is put 32′ 49″=1969″.

The Logarithm of 1969″ is	=	3.294246
With the Sun's Mean Anomaly 10ˢ. 17° 46′ 35″, I find, the Logarithm in the Table to be ſubtracted, is		0.0182
Corr. Variation 31′ 29″=1888″ Log.		3.276046

Example

Example 2. Suppoſe the Sun in Perigee, and the Moon diſtant from the Sun 45 Degrees, being in her Octant. I demand her greateſt Variation?

☽'s Variation *per* Table, *Fol.* 101, is 35′ 10″ = 2110′ Log. = 3.24282
Log. found by ☉ mean Anom, 6ˢ. 0° 0′ 0″ is 9.9753

Corr. Variat. of ☽ is 37′ 13′ = 2233″ = Log. = 3.348982

Note, The Logarithm found by the Sun's mean Anomaly muſt always be ſubtracted, and not added. But when (as in the laſt Example) the Logarithm to be ſubtracted exceeds the other Logarithm, the Radius muſt be added, that Subtraction may be performed; as is plain, if the Examples are duly conſidered.

☞ This and the two laſt Pages were ſent me by a Gentleman unknown (to whom I return my hearty Thanks) being a *Correction* of the Moon's Variation in Page 101; which having diligently peruſed, and finding it very uſeful, it merits a Place in this Work.

FINIS.

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